guide to MOBILITY **SMARTPHONES GET SMARTER, MORE PERSONAL** Cool Tools Editor Keith Shaw tests six of the hottest enterprise-ready smartphones. **Page 32**

NETWORKWORLD

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November 3, 2008 ■ Volume 25, Number 43

Morris turns 20

It was 20 years ago that the first serious worm attack served as a wakeup call for the IT community. **Page 10.**

10 network management companies to watch

Virtualization, apps performance, SaaS are key focus areas. **Page 12.**

Researchers demo advanced network control

Experimental OpenFlow technology can boost bandwidth, optimize latency and save power. **Page 22.**

NETWORKWORLD LIVE

Network World's 2008 IT Roadmap Conference & Expo tour stops in Washington, D.C. on Dec. 16 before heading to New York in 2009. Register at **www.networkworld.com/itrevents08**

Microsoft bets Azure will ensure its future

BY JOHN FONTANA

LOS ANGELES — Claiming to set the stage for the next 50 years of computing, Microsoft last week unveiled a cloud operating system and a complementary slate of developer resources that will become the core of its services platform and provide an online delivery option for all its current software.

The Azure Services Platform, which includes the cloud operating system called Windows Azure, defines the scalable back end that will support the services portion of Microsoft's software-plus-services strategy, which it has been laying out in bits and pieces over the past three years.

The platform is the coming-to-life of the well-known Internet Services Disruption memo that Ray Ozzie penned three years ago before becoming Microsoft's chief software architect. That memo laid out how Microsoft needed to embrace software plus services to remain relevant.

The Azure platform, which has at its core a highly tuned operating system two years in the making, is no less than Microsoft's largest bet yet to achieve

See Microsoft, page 18

The Google-ization of Bechtel

How the construction giant is transforming its IT operations to emulate Internet leaders and embrace SaaS

SHANNON MCINTYRE

BY CAROLYN DUFFY MARSAN

If you could build your IT systems and operation from scratch today, would you recreate what you have? That's the question Geir Ramleth, CIO of construction giant Bechtel, asked himself three years ago.

The question — and the industry benchmarking exercise that followed — prompted Bechtel to transform its IT department and model it after Internet front-runners Amazon.com, Google, Salesforce.com and YouTube. After all, these companies have exploited the latest in network design and server and storage virtualization to reach new levels of efficiency in their IT operations. Ramleth wanted to mimic these approaches as Bechtel turned itself into a software-as-a-service provider for internal users, subcontractors and business partners.

After researching the Internet's strongest brands, Bechtel scrapped its existing data centers and built three facilities with the latest in server and storage virtualization.

Bechtel also designed a Gigabit Ethernet network with hubs at Internet exchange points that it is managing itself instead of using carriers. Now, Bechtel

See Bechtel, page 28

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guideto MOBILITY

SMARTPHONES GET SMARTER, MORE PERSONAL

Cool Tools editor Keith Shaw tests out the hottest enterprise-ready smartphones. Page 32

iPhone 3G ★★★★★

MANUFACTURER: Apple **CARRIER:** AT&T
PRICE: $299 (16GB version); $199 (8GB version). Both require two-year contract, voice and data service plans.

GOODBADUGLY

Venture firm sticking with enterprise IT

Not all news on the enterprise-IT venture-capital front is bad. Fairhaven Capital Partners has closed an oversubscribed $250 million fund that it will use to invest in enterprise and consumer-technology companies, along with those in high-performance materials and digital media infrastructure. Paul Ciriello, managing director at Fairhaven, is secretive about which areas his team will target, but past investments have included virtualization firm Softricity (afterwards acquired by Microsoft) and storage company EqualLogic (now part of Dell).

Security rules so unfair! Wah!

Unfair policies prompt most employees to break company IT security rules, and that could lead to lost customer data, a Cisco study found. Surveyed employees (2,000 of them from 10 countries) said the top reason for noncompliance is the belief that policies do not align with the reality of what they need to do their jobs, according to Cisco.

Server-wrecker is sentenced

A 42-year-old Connecticut man was sentenced to prison for sabotaging three servers at his former employer. Prosecutors say that Priyavrat Patel knocked the servers offline over the Thanksgiving 2007 holiday, critically damaging operations at his former employer, Pratt-Read, a 200-year-old toolmaker based in Shelton, Ct. Patel pleaded guilty to computer-intrusion charges in January 2008.

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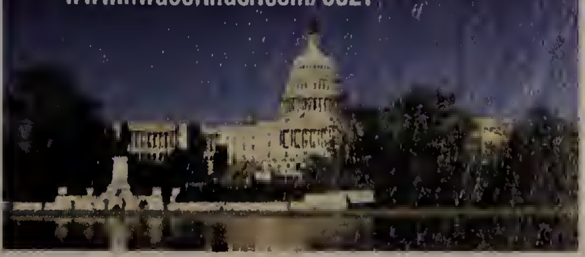

Male chauvinist pigs

Re: Why do women, men leave IT? (www.nwdocfinder.com/7323): Women leave IT because it is infiltrated with male chauvinists and bullies. I should know because I am a female who worked in the IT industry for almost 15 years. I had very good technical skills before I left, and come from a highly successful family of marine and mechanical engineers. I now drive a London taxi for a living, and I'd rather be beaten up and stabbed than go back into the IT industry.

In addition to my taxi company, I run another business, and my salary is now more than £60,000 [$98,000] a year. I was too thick to realize that working for someone else was a complete waste of time. I must have been a self-employed person trying to escape a rat race of vicious "no marks."

> "Women leave IT because it is infiltrated with male chauvinists and bullies."

Must admit that there seems to be a culture that exists within any specific industry, and the male IT workers almost always exhibit the following:

- Automatically think that a woman cannot be technical.
- Sidelines, bullies and undermines female IT workers.
- Is threatened by any woman who knows something about IT.

Don't get me wrong. The men in the taxi trade are 95% OK and yes, there are the 5% of moody male cabbies. I like my cabby male counterparts 500% more than my ex-IT male counterparts. So — there may be some truth in the statement I've just made about the IT culture being against women.

Carla

Discuss at www.nwdocfinder.com/7324

The problem with carriers

Re: Why falling cellular prices are a bad idea (www.nwdocfinder.com/7321): The carriers are the problem. Any problems they might have are of their own creation. It's hard to believe that this long after the supposed deregulation of AT&T and introduction of telco competition, I still have so few choices.

If I want to have Internet at my house, I have two choices: the only cable company or the only phone company. One provides not-very-good cable Internet. The other provides even worse DSL. Wireless phone is almost as bad, and if you want to do wireless Internet, you must enjoy pain. And I live in a city of 140,000 people. In 2008 there are still plenty of people in the United States who live outside of cities and only have one choice: dial-up modem pool over their one-choice phone company.

We already have near-monopoly status for these companies. I don't see how this can get worse.

David Backeberg

The residential high-speed-Internet market is a logical place for wireless operators to expand into — that is, allowing "data" subscribers to interface their "notebook connect" cards into Wi-Fi routers for multiple-user access. I'd get rid of my broadband connection (cable subscription) in a heartbeat!

Frank Costello

Craig Mathias replies:

The point I was making is that the situation will get worse if carrier revenues fall. I'm not sure I believe the Yankee Group numbers, but if they are correct, something is very wrong. I think the carriers could fix their pricing to attract more users in general (replacing land lines) and to specific services, like data. My fear is that they don't have the infrastructure to support more use, so a vicious cycle is created — higher prices, fewer customers, less service and so forth. That's not just bad for them, but also for us. And I still think the carriers will get into Wi-Fi in a big way — free spectrum, and great in high-density areas.

Discuss at www.nwdocfinder.com/7321

Programmers should always validate input

Re: Attack code for critical Microsoft bug surfaces (www.nwdocfinder.com/7327): The main causes of stack overflow are input routines that don't check how much data you're handing them, and there's simply no excuse for allowing that in professional code. I'm guessing that the buggy programs were written in C or in some variant like C++ or C#, which offer you better-protected data structures but still let you use the old-fashioned ones.

Bill Stewart

Discuss at www.nwdocfinder.com/7326

E-mail letters to jdix@nww.com or send them to John Dix, editor in chief, Network World, 492 Old Connecticut Path, Framingham, MA 01701-9002. Please include phone number and address for verification

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BLOGOSPHERE

Microsoft offers preview of Windows Server 2008 R2. The Microsoft Subnet blog reports, "Say hello to Windows Server 2008 R2. Live Migration for virtual machines is the promised 'marquee feature' of WS2008 R2, says Oliver Rist on The Windows Server team blog. But that may not be the OS's most important contribution. If the team has its way, enterprises will be drawn to the R2/Windows 7 combo to end the reign of VPNs as the mainstream method of secure networking." **www.nwdocfinder.com/7328**

Twitter squatting. Richard Stiennon writes in his Stiennon on Security blog, "If you have been immersed in real life lately you may not have twigged to Twitter, the microblogging site that has recently hit critical mass. By my measure whenever a new Internet phenomenon is noticed by the *Wall Street Journal* it is about six months until it gets purchased for an astronomical sum. My bet would be on Google acquiring Twitter before the end of the year. . . . Is there evidence of Twitter squatting (squitting)? Let's check. Yup, every single-letter TwitID is taken. Some are legitimate (Check out "S" for instance, that is a cool personal e-mail assistant service) but X, Y and Z are place holders." **www.nwdocfinder.com/7329**

Next hottest certification: Private Investigator. Jimmy Ray Purser writes in his Networking Geek to Geek blog, "I like watching those real-life crime shows. . . . It is amazing to see how folks can take a torn piece of toilet paper and solve a crime with it. . . . Chances are that sometime in our IT career we are going to be faced with few choices: Sushi or In-Out Burger? Reformat a machine or gather evidence to prosecute a hacker. Just like Fable II (which is on the highly recommended list of cool RPGs), every choice affects the outcome of your character." **www.nwdocfinder.com/7330**

Google's "Accessible View" experiment. Philipp Lenssen writes in his Google Blogoscoped blog, "Google has added an opt-in experiment to its Experimental Search page. Called 'Accessible View,' when you join this one you will see a blue focus box around individual search result items in a Google Web search. You can then use the up and down arrows on the keyboard to select different items, and hit enter to go to the specific page. The blue focus box is 'magnified to aid low-vision users,' Google says, and that 'if you are using a screen reader . . . you will hear the relevant information spoken automatically as you navigate.'" **www.nwdocfinder.com/7331**

IT VIDEO

INTERVIEWS, THE COOLEST TOOLS AND MORE

NW VIDEO:

How is the economy affecting your IT budget?

Network World asks the attendees of the recent Gartner Expo in Orlando about the down economy and its impact on their IT budgets.

www.nwdocfinder.com/7332

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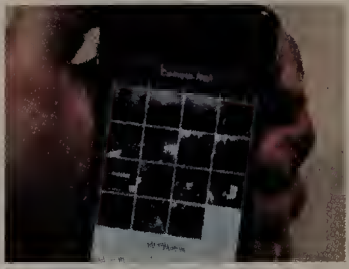

iPhone app: MobileFotos

View your Flickr photos without taking up a lot of space on your iPhone. Plus it's an easy way to upload new images to Flickr.

www.nwdocfinder.com/7333

IDG NEWS WIRE:

OLED gets larger

Samsung's SDI prototype 40-inch OLED screen, already the largest OLED screen, now has full high-definition.

www.nwdocfinder.com/7334

BEST OF NW'S NEWSLETTERS

Collocation data centers: It's about the uptime

Tech exec: In mid September, Hurricane Ike struck a major blow to Houston, the nation's fourth largest city and the global center of the energy industry. Much of the city was without power for weeks, leaving Houston's business hubs in the dark or surviving off generator power. In the midst of all the chaos, one nondescript building just a few miles outside of downtown proved to be a fortress for more than a few companies and their data centers. This building is the home of CyrusOne, a Tier 4 data-center facility providing corporate colocation services. Inside this building, it was like Ike never happened; not a single customer felt so much as a blip from the storm. CyrusOne's continuous-availability guarantee is one reason so many companies collocate their critical business applications there. According to CEO David Ferdman, there are numerous reasons why companies enter into a data center collocation arrangement, but for CyrusOne customers, uptime is everything. In this newsletter, we look at the various benefits of outsourcing data center operations to a collocation provider.
www.nwdocfinder.com/7255

Education: Cisco is getting ready to launch its expert-level wireless certification and is looking for beta testers. Registration for a beta version of the CCIE Wireless written exam has already begun. The beta tests cost $50, last three hours, and are ongoing until Nov. 14 at Pearson VUE testing centers worldwide. A few months ago, Cisco announced its first wireless certification, which is now part of the Cisco Certified Network Associate (CCNA) line of credentials. The CCIE expert-level wireless certification is sure to gain lots of interest from wireless networking engineers. "The CCIE Wireless certification, to be launched later this year, will validate that a professional has the expertise to design, manage and support … wireless networks, as well as the job skills and technical knowledge required of an expert-level network IT practitioner," Cisco says. "This written exam is the first step in obtaining the CCIE Wireless certification. Successful candidates will have mastered broad theoretical knowledge of wireless networking and demonstrated a readiness for the CCIE Wireless lab examination." Candidates who pass the beta exam will be eligible to schedule a lab exam. The written exam will cover numerous topics related to wireless LANs.
www.nwdocfinder.com/7256

Avaya names Kevin Kennedy new CEO

Avaya has named a new president and CEO: Kevin Kennedy, currently the CEO of JDS Uniphase, makers of optical communications hardware. Kennedy will take over Avaya, which focuses on enterprise-communications software, in early January, replacing interim CEO Charles Giancarlo who came onboard earlier this year when Lou D'Ambrosio left for medical reasons. Kennedy and Giancarlo worked together in the 1990s as Cisco executives. Kennedy left the company in 2001, while Giancarlo stayed until 2007. Kennedy also has served as COO of messaging-software vendor Openwave Systems, and spent 17 years at Bell Laboratories. In Avaya's analyst meeting last month, Giancarlo described the company as being in the midst of an overhaul to correct basic internal and external business systems to improve efficiency and customer satisfaction. He said those corrections will be in place by the end of next year and that 2010 will mark a new phase for Avaya. Giancarlo will remain on the Avaya board of directors after Kennedy takes over as CEO. **www.nwdocfinder.com/7337**

New Cisco edge router on tap. Cisco is expected to unveil a new service provider edge router on Nov. 11 that probably will succeed its aging 7600 series Ethernet platforms, according to a report from Oppenheimer & Co. issued last week. "We believe the platform will take on the ASR name (ASR X000) but will be materially different [operating-system] and feature-wise from the previously announced ASR 1000" for enterprises, states the Oppenheimer bulletin, authored by analyst Ittai Kidron. Oppenheimer believes the ultimate capacity of the new edge router will exceed that of Juniper Networks' MX-series Ethernet routers, "yet we expect the initial capabilities to be sub-par, and we think it will take Cisco some time until the edge features fully develop." A Cisco spokesman says the company does not comment on speculation about new Cisco products or product road maps. **www.nwdocfinder.com/7338**

DOJ: Verizon must divest assets in 22 states. The U.S. Department of Justice said last week that Verizon will have to divest assets in 100 areas covering 22 states as a precondition to acquiring Alltel Wireless. In addition to divesting its assets throughout North Dakota and South Dakota, Verizon must also divest wireless businesses in parts of Alabama, Arizona, California, Colorado, Ohio, Minnesota and North Carolina, among other states. "The divestitures required are necessary to protect wireless consumers and are among the most extensive required by the department in a wireless case," said Thomas O. Barnett, the assistant attorney general in charge of the DOJ's antitrust division. The FCC is scheduled to vote on whether to approve Verizon's proposed $28 billion acquisition of Alltel this week. If the FCC approves the deal, it would create a super-carrier that will have an estimated 80 million wireless subscribers, and would help Verizon expand its network coverage into more rural areas. **www.nwdocfinder.com/7339**

Google introduces service-level guarantee for its Apps suite. Google is offering a service-level agreement for a version of Google Apps, a move that may provide some comfort to enterprises spooked by a long Gmail outage and a buggy Apps portal last month. The Premier Edition of the Google Apps online-productivity and collaboration suite will come with a 99.9% per-month uptime guarantee for the Gmail, Calendar, Docs, Sites and Google Talk services. In effect, Google is promising compensation if downtime exceeds around 45 minutes a month — but it won't count outages lasting less than 10 minutes towards this total. The SLA conditions define downtime as when the "user error rate" exceeds 5%, as measured on the server side. Customers could therefore experience far more than 45 minutes of downtime, in shorter bursts, without compensation. If Google doesn't hit its marks, it will give customers a credit toward more service. **www.nwdocfinder.com/7340**

Texas Memory hits 1 million IOPS with fast flash storage. Texas Memory Systems has broken the 1 million-input/output-operations-per-second barrier with a flash memory-based solid-state disk system, the company announced last week. IBM boasted in August that it cracked the 1 million IOPS barrier in research known as Project Quicksilver, but did not say when its 1 million IOPS technology would be available for sale. Texas Memory's RamSan-5000, already on the market and deployed by an unidentified U.S. customer, can scale up to several million IOPS, by installing a Turbo feature that costs extra or by increasing capacity, the vendor says. The 5000 deployment combines 10 RamSan-500 arrays, each of which delivers 100,000 IOPS. Working with either Fibre Channel or InfiniBand interfaces, and with a RAM cache of 640GB, the system reaches 1 million random-read IOPS with response times of less than 1 millisecond. **www.nwdocfinder.com/7341**

Sun blames Wall Street for $1.7 billion loss. Blaming the downturn in the financial sector, Sun reported a $1.68 billion loss for its most recent fiscal quarter. The bulk of the loss came from a one-time $1.45 billion goodwill impairment charge. Excluding this and other one-time charges, the loss was $65 million. Revenue for the quarter, which ended Sept. 28, was $2.99 billion. Sun blamed its revenue shortfall on trouble in the financial services sector, in particular, which has been hammered by the global financial crisis. Financial-sector revenue in the northeastern United States was down 20% year over year, while North American revenue dropped 13% overall, Sun said. Wall Street has long been a stronghold for Sun's servers and workstations. The company now has missed analyst expectations for three straight quarters, and its profit margins are eroding because it increasingly is selling low-end servers while being squeezed by competitors. **www.nwdocfinder.com/7342**

Telework programs as good as cold, hard cash, survey says. Companies offering telework programs will find their employees not only more productive but also happier, because of the money they are able to save by working from home at least part of the time, according to a recent survey. The U.S. Unified Communications Survey, sponsored by Mitel Networks and conducted by Zoomerang Market Research, shows that nearly 60% of the 821 American white-collar workers it polled save at least $25 per month on fuel costs by working at home. Another 25% reported saving more than $100 per month by performing their jobs outside the office. Fuel prices, however, aren't the only drivers for employers looking to offer employees a more flexible work environment: 64% of the teleworkers surveyed said they are more productive and produce better-quality work when they're allowed to do their jobs from a location other than the office. **www.nwdocfinder.com/7343**

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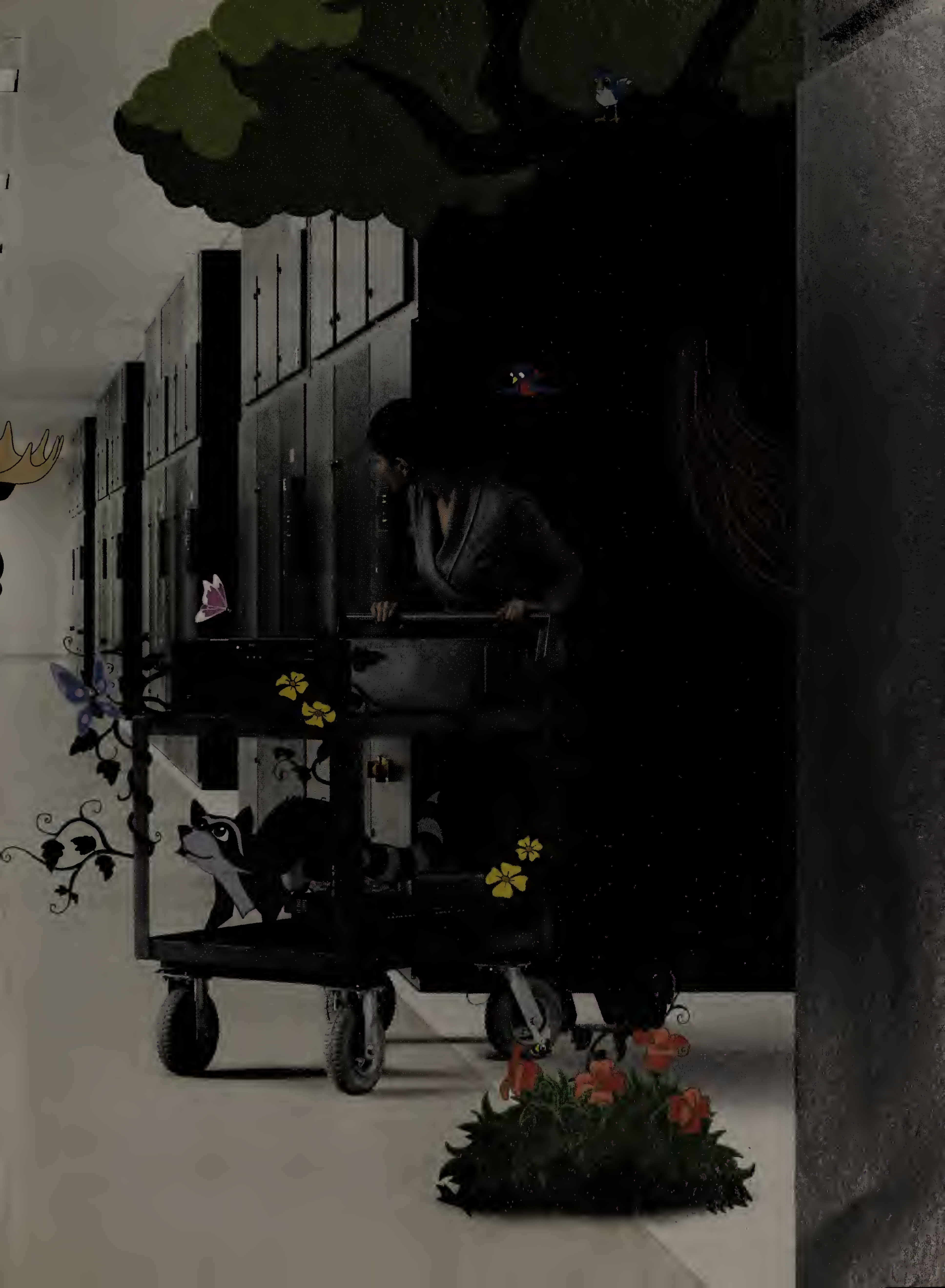

Morris worm turns 20

First Internet attack spawned panic, public awareness and security research

BY CAROLYN DUFFY MARSAN

The Internet marked an infamous anniversary Nov. 2, when the Morris worm turned 20.

Considered the first major attack on the 'Net, the Morris worm served as a wake-up call to the Internet engineering community about the risk of software bugs, and it set the stage for network security to become a valid area of research and development.

"It was a really big deal," says Eric Allman, a computer programmer who in 1981 authored sendmail, open source Internet e-mail software, while he was a student at the University of California at Berkeley. Today, Allman serves as chief science officer at Sendmail, a company that sells commercial-grade versions of the software.

"The biggest implication of the Morris worm was that the Internet was very small ... and it was considered a friendly place, a clubhouse," Allman says. "This [attack] made it clear that there were some people in that clubhouse who didn't have the best interests of the world in mind.... This made it clear we had to think about security."

Despite the high-profile nature of the worm, experts say its importance was not fully appreciated at the time. "The really interesting lesson of the Morris worm is how little long-term impact it had," says Steve Bellovin, a professor in the Department of Computer Science at Columbia University who was developing an early firewall at Bell Labs when the attack occurred. "It showed people who cared how dangerous buggy software could be, but nobody else really paid that much attention to network security afterwards. It wasn't until the mid-1990s that it became an issue again."

Now an MIT professor, Robert Tappan Morris let loose the Morris worm 20 years ago while a college student.

The Morris worm was written by Cornell University student Robert Tappan Morris, who was later convicted of computer fraud for the incident. Today, Morris is a respected associate professor of computer science at MIT.

Launched around 6 p.m. on Nov. 2, 1988, the Morris worm disabled approximately 10% of all Internet-connected systems, which were estimated at more than 60,000 machines.

The Morris worm was a self-replicating program that exploited known weaknesses in common utilities including sendmail, which is e-mail routing software, and Finger, a tool that showed which users were logged on to a net.

The Morris worm was able to break into Sun 3 systems and Digital VAX computers running BSD Unix. The fast-spreading worm kept copying itself and infecting computers multiple times, causing many systems to fail.

"At first, we had no idea who sent the worm," Allman says. "It was quite clear it was intentional, but we had no clue who it was or why it was sent. There was a sense of panic at the time, which was unfortunate but very understandable."

The attack disrupted Internet connectivity for several days, prompting some organizations including the U.S. Department of Defense to unplug their Internet gateways to prevent infection.

"People disconnected from the network because they were afraid of what might happen," Allman says. "One of the ironies is that disconnecting from the 'Net also broke down our major communications channel. That's why it took longer to get everyone back up."

At the time the worm was launched, the Internet had no commercial traffic or Web sites. Damage was limited to researchers at government agencies, universities and a handful of corporations who used the network to exchange e-mail and transfer files. Nonetheless, the attack was covered widely by mainstream publications such as *The New York Times*.

"The Morris worm was the first time most people ever heard the word 'Internet,'" Bellovin says. "For most people, it was a novelty, a strange and wondrous world ... and one rogue operator could take it down."

For some, the Morris worm was a career-changing event. Eugene Spafford was an assistant professor of computer science at Purdue University when Morris hit. Today, Spafford is executive director of Purdue's Center for Education and Research in Information Assurance and Security.

"I had been told by my advisors there was no future in applied computer security research," Spafford says. "When this happened, suddenly a whole lot of people realized that the development of systems had leapfrogged the controlled, mainframe environment and a different kind of security model needed to be observed. ... We needed a more engineering approach, a more practical approach."

The Great Worm

The Morris worm was the first major worm attack, and it was dubbed "The Great Worm" in a reference to J. R. R. Tolkien.

Previously, researchers had been developing benevolent worms that could be used to automatically install software updates, but no one had launched a malicious worm onto a network in an uncontrolled fashion.

The Morris worm served as a precursor to other well-known worm attacks, including 1999's Melissa, 2001's Code Red and 2003's Slammer, all of which targeted systems running Microsoft software.

Lately worms have been less popular attacks than viruses or e-mails with URLs that point to malicious Web sites. "Worms are actually relatively rare compared to the number of virus attacks," Allman says. "For the average user, phishing is a worse problem."

"We haven't seen a big Internet-clogging worm in several years, and there are several reasons for that, including the increasing prevalence of [network address translation] boxes and personal firewalls that make it difficult for a worm to do the scanning the way the Morris worm did," Bellovin says.

The Morris worm foreshadowed how future distributed denial-of-service attacks would be used to overload systems and knock them off the Internet. "There had never been a simultaneous large-scale security event prior to that," Spafford says. "It was the first significant denial-of-service issue that came to people's attention related to computing. And it was the first event that crossed vendor platforms because it attacked Berkeley Unix and Sun systems, and in that regard I would say we haven't seen many other incidents like that. Most incidents have been directed at one vendor's platform."

Spafford likens the Morris worm to today's botnets, which are large volumes of compromised computers used to send spam.

"The software that turns systems into zombies and adds them to botnets are like slow-moving worms," Spafford says. "They don't cause a denial of service, but they do create a slow infiltration and they spread to other machines automatically. There are quite literally millions of machines — some estimates are 100 million machines — that are inside botnets."

While the Morris worm was a high-profile attack that took down large swaths of the Internet, today's Internet attacks are focused on individual systems and tend to be stealthy. Instead of curious college students breaking into systems for bragging rights, it's more common to see criminals infect systems with viruses designed to be invisible.

"The focus of today's Internet attacks are profits, and there are no profits in taking down the Internet," Bellovin says. "The sophisticated bad guys are being much more careful about the way they attack systems."

Although it caused far less damage than follow-on attacks, the Morris worm is remembered for its impact on the computer science community.

"The Morris worm opened up computer security as a legitimate topic," Allman says. ■

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10 IT mgmt. start-ups to watch

Virtualization, application performance, SaaS among focus areas

BY DENISE DUBIE

Venture capital is becoming scarce in some tech sectors, but that hasn't stopped these 10 start-ups from delivering new tools for managing IT systems.

Newcomers delivering technologies designed to automate tasks, do more work with fewer resources and streamline operational processes could weather the financial storm better than some. By winning customer accounts with innovative approaches to reducing labor, improving performance and optimizing service delivery, rookies in the management market might earn scarce IT budget dollars. That's why despite venture capital investors being cautious, industry watchers say enterprise IT customers will continue to see new players in the management market.

"Innovation continues to occur, for one, because it is a large market — there are a lot of applications and infrastructure that need managing — and as technologies, such as virtualization, evolve in environments, we need tools to better manage and support the changes across environments," says Cameron Haight, research vice president at Gartner. "Historically the reasons to invest in management technology include reducing total cost of ownership, improving business and service quality, and responding better to customer demands. That value proposition holds true irrespective of the economic conditions."

Here are 10 start-ups whose technologies hold the promise to improve enterprise IT management.

AppDNA

Founded: January 2008

Headquarters: Chicago and London

Focus: AppTitude application-compatibility testing software helps IT professionals assess application version, operating system and virtualization options before it is deployed to a production environment. The software profiles and models various deployment scenarios, and tells IT professionals the impact and technical changes the environment would undergo because of an application's deployment without requiring extensive manual testing.

Why it's worth watching: As companies invest more in server and desktop virtualization technologies, such products as AppTitude will help IT managers determine which applications will perform better and maximize resource utilization on a virtual platform.

"People are trying to determine what the best delivery vehicle is for end-user applications. AppDNA checks dependencies and application attributes to gauge if an application would be suited to a Citrix thin client application, for instance," Gartner's Haight explains. "I've been somewhat surprised that there hasn't been more in the way of such assurance tools for the client environment as it evolves toward virtualization."

How company got its start: Spun out of IT-consulting and software business Camwood Ltd. by founders hoping to develop commercial software to ease corporate migrations on Windows platforms and promote the adoption of application virtualization technologies.

How company got its name: Reflects the idea of an application having DNA, or metadata, that can help organizations best fit an application into their environment.

CEO: Mike Welling in 1999 founded Camwood and before that worked for GE Capital, commercially owning and delivering one of the company's largest global IT projects.

Funding: Foresight Group invested $3 million in April 2003, which Camwood used to develop the product and spin the company off earlier this year.

Who's using the product: AppDNA lists King's College London, Tube Lines (London Underground) and Newham Borough Council (host of the 2012 Olympics) as customers.

Apptio

Founded: October 2007

Headquarters: Bellevue, Wash.

Focus: Developed technology dubbed the Transparency Engine, which is delivered in a software-as-a-service model on a scheduled basis. The software measures how IT services are consumed, and assigns financial metrics to the services to enable IT to establish chargeback programs or better communicate its value to the business, the company says.

Why it's worth watching: "Globalization, consumerization, new competitors and new service models are radically changing the shape of IT. IT leaders must develop greater transparency into the costs, utilization and operations of their IT services," says Barbara Gomolski, research vice president at Gartner.

Haight adds: "With virtualization, chargeback is percolating. IT is looking for ways to manage sprawl and proliferation, and chargeback can be used as a behavior-modification tool in that it makes it transparent to people what resources they are actually consuming."

How company got its start: Founded by President and CEO Sunny Gupta and CFO Kurt Shintaffer, who previously had worked together at iConclude.

How company got its name: Company officials say there is no deeper meaning to the name, but it sounded "crisp and no one else had it yet."

CEO: Gupta previously founded iConclude, a run-book-automation vendor later acquired by Opsware for $62 million, which in turn was bought by HP. Before iConclude, Gupta ran the Java/.Net performance product management group at Mercury Interactive, also acquired by HP.

Funding: $7 million in Series A funding closed in November 2007 led by Greylock Partners and Madrona Venture Group.

Who's using the product: Alaska Airlines, Finlay Enterprises, HomeStreet Bank, Motricity, NYK Logistics and Blue Cross Blue Shield of Kansas City are among Apptio's customers.

BlueStripe Software

Founded: June 2007

Headquarters: Research Triangle Park, N.C.

Focus: FactFinder software, designed for VMware virtual server environments, performs an automatic discovery of an application and its components. It then details all the application's connections and dependencies, benchmarking normal behavior to enable the software to detect performance anomalies.

Why it's worth watching: Industry watchers predict that application performance will become a key challenge for IT departments deploying virtualization.

"What BlueStripe proposed to do initially, the discovery of applications, is interesting, but what really would do the trick for the start-up is when they can effectively monitor applications within a container, something that very few products can actually do," says Jean-Pierre Garbani, vice president and principal analyst at Forrester Research. "Anything that helps IT in measuring application performance in virtual machines will be very welcome."

How company got its start: Management industry veterans spotted the opportunity to develop technology that could address the performance problems virtualization can introduce to distributed environments.

"The loss of visibility [in virtual environments] is breaking the current management tools, and we've developed a technology that can manage the application wherever it goes, even if part of the application is on virtual systems, part on physical servers and even if part is tied to mainframes," says Vic Nyman, BlueStripe COO and former CEO of configuration-management vendor Relicore, which Symantec acquired in 2006. Nyman also held positions with IBM/Tivoli and Wily Technology,

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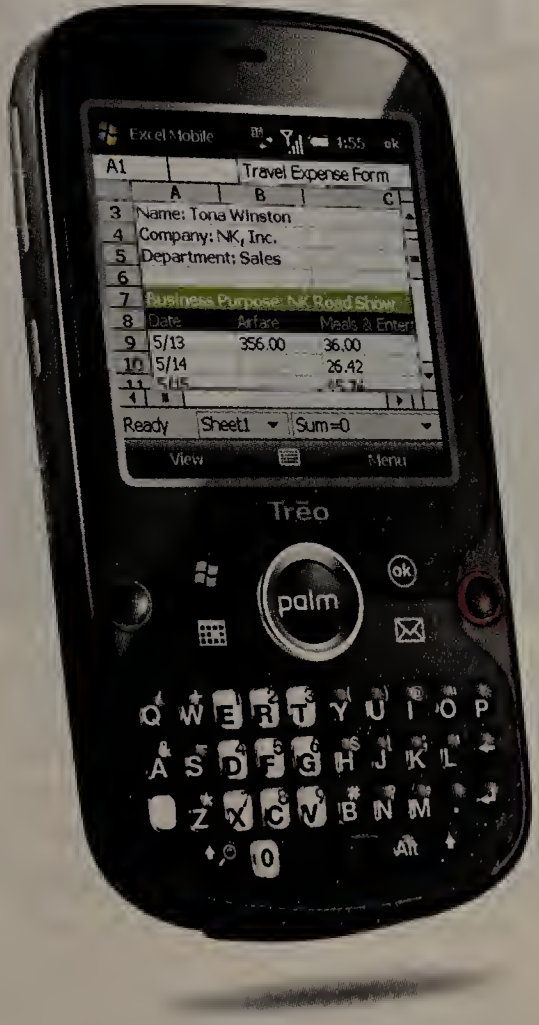

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the application management vendor CA acquired in 2006.

How the company got its name: Two company executives graduated from Duke University, two others from rival University of North Carolina, inspiring the BlueStripe name and logo, which features the two colleges' shades in "the battle of the blues."

CEO: Chris Neal formerly was vice president of field operations at Wily, and held positions at Oracle and NetDynamics.

Funding: Initially self-funded; $5 million in Series A funding from Trinity Ventures in December 2007.

Who's using the product: Square 1 Bank, First Vertex. and Mi-Co have signed on. Additionally, BlueStripe is working with finance and telecom leaders.

DynamicOps

Founded: January 2008

Headquarters: Burlington, Mass.

Focus: Virtual Resource Manager (VRM) is software that installs on a virtual or dedicated server and communicates with interfaces from such hypervisor vendors as Citrix, Microsoft and VMware. VRM queries the environment to find available resources and enables IT managers to use a console to allocate virtual resources and assign permissions.

Why it's worth watching: "Essentially, DynamicOps is automating virtual-machine provisioning in a way that really delivers a business service, rather than just an IT management tool," says Andi Mann, research director at Enterprise Management Associates (EMA).

As a start-up, the company will be challenged to win budget dollars against myriad management competitors, but Mann adds: "It is very heterogeneous, with support for VMware, Citrix, Microsoft (Virtual Server and Hyper-V) and Sun Solaris (LDOMs and Containers), across Windows, Linux and Unix. It also has a lot of functionality, controlled from a very clean GUI that appears to be extremely intuitive and easy to use. So, it has an opportunity to grab a good deal of business."

How company got its start: The technology was developed by Credit Suisse's Global Research and Development Group. The software has been in production for more than two years, managing thousands of virtual desktops and servers at multiple Credit Suisse data centers in four locations worldwide.

How company got its name: Company founders based the name on the premise of dynamic operations in lights-out data centers.

CEO: Rich Krueger, formerly the executive vice president of business development and international sales at Incipient, a storage virtualization company. Before Incipient, Krueger was vice president of business development for LightSpeed Software.

Funding: Funded by Credit Suisse's Next II venture group.

Who's using the product: Company officials say DynamicOps has about 10 customers, with another 20 in proof-of-concept trials. They declined to name any.

Hyper9 (formerly InovaWave)

Founded: October 2007

Headquarters: Austin, Texas

Focus: Hyper9 search software is packaged as a virtual appliance and uses five data collection methods to gather configuration, patch and other data about virtual and physical machines. To collect data, Hyper9 inspects VMware's VirtualCenter database, VirtualCenter via an API, host servers, virtual machines and the sessions within the virtual machines. The software aggregates and presents data through a Web-based interface, coupling the search results with business-intelligence metrics and potential actions to take in response to search results. The company makes the search platform available for free.

Why it's worth watching: "Hyper9 is addressing one of the biggest problems in virtualization — the complexity that is apparent in virtual-machine sprawl and inconsistent configurations," EMA's Mann says. "Hyper9 allows operators and administrators — even less-skilled staffs — to find and compare detailed virtual-machine configuration information and even control the virtual machines themselves with stop, start, pause, migrate, clone, snapshot and other capabilities."

How company got its start: Company founder and CTO Dave McCrory, who formerly worked at virtual automation vendor Surgient, wanted to develop a system to quickly deliver the relevant data IT managers needed to more quickly solve performance problems and better understand the components of their virtual infrastructure.

How company got its name: "Hyper" means "over, above and beyond," and denotes the top layer or level, as in "hypervisor." The number 9 represents the top or limiting number, denoting the upper boundary.

CEO: Chris Ostertag, also president, formerly was vice president of worldwide sales and field operations for data encryption and compliance vendor Credant. Before that, he led Sun's worldwide team of more than 4,500 technical sales experts.

Funding: $8.5 million in funding from Matrix Partners and Silverton Partners in October 2007, and an undisclosed amount in Series B funding from Maples Investments in August 2008.

Who's using the product: They couldn't reference customer names publicly, but company officials say they expect to have more than 100 companies using the product by year-end.

New Relic

Founded: January 2008

Headquarters: Menlo Park, Calif.

Focus: Rails Performance Management (RPM) software is delivered as a service. IT managers install a plug-in in the Ruby on Rails application they want to manage, and the application delivers performance data to New Relic for presentation and correlation. RPM has three paid-subscription levels and RPM Lite, which is free.

Why it's worth watching: Ruby on Rails is the open source Web-application framework du jour for Web 2.0 applications, and industry watchers expect it to take path similar to that of Java 2, Enterprise Edition, which took the place of many C++ applications in customer environments. Plus, company founder and CEO Lewis Cirne headed Wily, which was considered an innovator in Java application management.

"New Relic is doing for Ruby apps what Wily did for Java apps, but with a twist. They are doing it from a cloud perspective," says

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Gartner's Haight. "Data from plug-ins on Ruby applications flows to them and they present it in a portal, which gives the company a lot of insight into this application type that hasn't seen much play in the enterprise yet."

How company got its start: Following CA's acquisition of Wily, Cirne says he turned his attention to disproving some misconceptions around Rails applications, such as that they can't scale for the enterprise. "I focused on starting a company that could help Rails go mainstream as a serious business application, and I believe providing performance management will help," he says.

How company got its name: Cirne plugged his full name into a Web-site anagram generator and one of the results, New Relic, stuck.

CEO: Cirne founded Wily in 1998 and developed its flagship performance-monitoring solution, Introscope. Most recently he was an Entrepreneur in Residence at Benchmark Capital. He holds seven patents, including four related to Wily's core technology.

Funding: $3.5 million in Series A funding closed in February 2008 from Benchmark.

Who's using the product: New Relic claims more than 700 customers in production, of which more than half are paying for service. Named customers include Ourstage, Shopify, iOffer and 37 Signals.

PacketTrap Networks

Founded: May 2007

Headquarters: San Francisco

Focus: The Perspective platform monitors network performance, manages faults and reports on device availability data. It targets organizations with 100 to 5,000 employees.

Why it's worth watching: PacketTrap offers a "high-end product suite that starts with a free set of tools that is great for hands-on troubleshooting and administration," says Jim Frey, senior analyst at EMA. The company also "leverages a large community of customers to participate in and drive the direction of the product," he says. And it "has spent time developing some very valuable advanced policy and intelligent baselining features that commonly only come with much-higher-cost solutions."

How company got its start: Company founders took on network performance-management for the midmarket because they didn't see any products that could solve managing virtualization, VoIP and other emerging technologies adequately for customers that might not be considered enterprise size. They aimed squarely at SolarWinds as the top competitor.

How company got its name: Derived from capturing packets to manage network and application performance.

CEO: Steve Goodman previously was vice president of the Storage and Business Continuity Business Unit at SonicWall.

Funding: $5 million in Series A funding from August Capital in October 2007.

Who's using the product: Frontier Materials, Enviance and the city of Dublin, Calif., are among PacketTrap's customers.

Porttracker

Founded: December 2007

Headquarters: Basingstoke, England

Focus: Packages its network management software of the same name on an appliance. That enables network managers to quickly track and report on what's connected to the network for troubleshooting, security and capacity-planning. The product builds a view of the switch-port inventory; it's designed for companies with more than 1,000 ports.

Why it's worth watching: "Porttracker is an example of a technology of high priority to security-management teams, in terms of visibility into actual network activity," says Scott Crawford, research director at EMA. "Porttracker provides information as to what is connected to the network and where, which helps to correlate detected activity with known network nodes. This helps improve the accuracy of security-event correlation, helping to improve the signal-to-noise ratio of network visibility."

How company got its start: The founders began developing the technology and appliance in late 2005 to help reduce the challenge of "port wastage," which company officials say can cost companies in a big way.

How company got its name: Based on the technology's ability to track what is connected to a network down to the port.

CEO: Julian Rigg has previously held senior management positions with Wall Data, Cisco, Quadritek and Lucent.

Funding: Privately funded.

Who's using the product: England's University of Hertfordshire and others.

SevOne

Founded: February 2005

Headquarters: Newark, Del.

Focus: Performance Appliance Solution (PAS), first released in June 2008, comes packaged on five appliances that range in capabilities depending on the size of the environment to be managed. PAS captures performance data for capacity planning or ongoing monitoring and management with such standard protocols as SNMP and Cisco's NetFlow to collect network traffic data. It can, for example, measure how VoIP application traffic is impacting network performance.

Why it's worth watching: "SevOne offers a product that is carefully crafted, packaged and priced to hit a growing market segment interested in a value-priced (or relatively inexpensive) but functionality-rich product," says Rich Ptak, founder and principal analyst at Ptak, Noel and Associates. "The company identified specific pain points and came up with what appears to be a technically strong solution whose installation, implementation and payback period seem to go easily and start promptly."

How company got its start: Founders wanted to develop a network and application performance-management product that could scale to meet the demands of large enterprise companies and service providers. The company developed a peer-to-peer architecture for its appliance technology enabling it to handle more transaction volumes and monitor performance across large, distributed networks.

How company got its name: Named after the slang for the "Severity 1" performance problems network managers face

CEO: Michael Phelan, previously founder and president of consulting and storage-network integration firm StorNet, which was sold to Vanguard Technologies in 2000.

Funding: Self-funded until July 2006, when it raised $1.5 million of outside capital in a transaction led by Osage Ventures of Philadelphia.

Who's using the product: SevOne lists Comcast, HBO, Credit Suisse, Hawaii Telecom and JPMorgan Chase among its customers.

Zyrion

Founded: December 2007

Headquarters: Sunnyvale, Calif.

Focus: Traverse is a business-service-management (BSM) product with a "strong network-management foundation" for midmarket companies that might not be able to afford several management applications, officials say. The software installs on a server and discovers the environment, and customers designate the business services they wanted managed.

Why it's worth watching: Industry watchers say Zyrion is a start-up with a mature technology. "They are a polished-up relaunch of the NetVigil product, which was originally offered in the market by [CEO Vikas Aggarwal's] first company — Fidelia," says EMA's Frey.

How company got its start: Following a series of acquisitions with previous companies, company founders focused their energies on building a company that could address BSM, and on managing such technologies as virtualization for midmarket companies.

How company got its name: Founders liked the name Orion, but say it is overused in the IT industry. When "Zyrion" was suggested, they decided it was close to what they wanted — and it had an available domain name.

CEO: Aggarwal previously founded Fidelia, which Network General acquired in 2006 to incorporate the BSM technology into its network suite. NetScout bought Network General in 2007.

Funding: Privately funded

Who's using the product: Alexander Open Systems is one of Zyrion's approximately 10 customers. ■

CORRECTION

■A chart connected with the story "Can outsourcers survive the economic storm?" (Oct. 20, page 14) should have shown that 21% of respondents said yes and 79% no.

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Microsoft

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that relevancy as it moves into a market already active with cloud environments from Amazon.com, Google, IBM and others.

"[Azure is] designed to be the foundation, the bedrock underneath all of Microsoft's service offerings for consumers and business alike," Ozzie said last week when introducing Windows Azure at the company's annual Professional Developers Conference (PDC). "The systems that we're building right now for cloud-based computing are setting the stage for the next 50 years of systems, both outside and inside the enterprise."

The Azure platform finally provides the confluence point for a number of loosely related cloud technologies Microsoft has been developing, including Live Mesh, the Identity MetaSystem and Microsoft Online Services.

Those infrastructure and application services, which complement the Azure operating system, will hook onto the Azure Services Platform to enrich its development environment and provide core services to online applications.

Microsoft's effort is not without major challenges. The services platform is only at the preview stage; it's initially tied predominantly to Microsoft's technologies although it is promising openness; and Microsoft has to succeed in wooing an army of developers.

"The approach to the Azure Services Platform follows a well-known pattern: Coming late to the party, Microsoft must make up now by enticing developers to embrace this new platform and creating the 'killer-apps' needed to make Azure a success," said Felix Gaehtgens, a senior analyst at Kuppinger Cole. "There are very few established dominant vendors in this space, and whilst some customers are experimenting, very few businesses have already bet the farm on a specific cloud platform. Microsoft has a history of turning the ship around and catching up quickly when it wants to," he said.

Besides introducing Azure for the back end, Microsoft highlighted front-end tools. It provided a glimpse of Windows 7 and introduced online Office Web applications in the mold of Outlook Web Access that run on a PC, phone or browser.

The Windows 7 demos focused on slick user-interface refinements and consumer features rather than enterprise tools, but the software is still in a pre-beta cycle.

The Office Web applications provide online versions of Word, Excel, PowerPoint and OneNote. While not as full-featured as the desktop versions, the online applications let users create, edit and collaborate on Office documents. They also plug into the services model through the sharing and synchronization of information across devices fostered by Microsoft's Live Mesh, itself a component option via the Azure platform's Live Services.

Microsoft also showed coming versions of Visual Studio 2010; introduced its Live Framework that will help developers build applications that run across PCs, phones and the Web; and highlighted its Oslo modeling tools that will be key to developing applications for the Azure era of Windows.

Developers were optimistic about the possibilities. Red Prairie, which develops supply-chain management software, showed a prototype product-recall application using the Azure platform and its SQL Services feature.

Other developers are trying to get their hands around where and when they could move to the cloud. "We could look at moving certain data or services or CPU-intensive calculations and operations to the cloud, but we have to prove the data is secure," said Edwin Kusters, an IT consultant with Hot ITem. He said privacy laws in the Netherlands would be a big factor in what kinds of operations may move into the services realm. The Azure platform has to get "more concrete" so he can better understand where he can go with it, he said.

Azure and the Azure Services Platform are a first implementation with a Community Technology Preview out now and a wider beta-testing coming in the next few months. Microsoft expects the platform to roll out live in the second half of 2009.

Unique to the operating system is its Fabric Controller, which makes data-center resources appear as one big pool to ensure service availability even if individual servers fail. The controller also lets users upgrade services on the fly. "It sounds to me like they have reinvented VAX clusters on top of Windows," said Al Gillen, an analyst with IDC. "They are in effect creating a single system image in fabric." With that will come application design considerations, he said. "You are moving from an OS API to a service-oriented API. You become more married to the fabric than the OS."

Microsoft is using the fabric design to tout a scale-out model using more boxes, rather than the scale-up model of increasing CPU and memory in individual boxes. It has worked with Dell to develop customized hardware for the Azure operating system and the fabric design that will run in its data centers.

The infrastructure layer of the Azure Services Platform provides Live Services, such as Hotmail and Live ID, that developers can choose to use with their applications. The layer also includes SQL Reporting and Analysis services at the heart of a database for the cloud, and .Net Services pulls in such features as the federated-identity services of the Geneva platform introduced at PDC.

In addition, Microsoft is providing Dynamics CRM's core business service engine and SharePoint's collaborative engine as two other basic services on the infrastructure layer.

Microsoft will also run its current online services including Exchange, SharePoint and Office Communications Server. ■

Layered approach

Microsoft's Azure Services Platform has three layers: the base Azure operating system, a layer of such infrastructure services as security, and a top layer of such online applications and services as Exchange Online and Windows Live.

Online applications and services

Windows Live, Office Live, Exchange Online, SharePoint Online, Dynamics CRM Online

Infrastructure services

Live Services	.Net Services	SQL Services	SharePoint Services	Dynamics CRM Services
A set of building blocks for handling user data and application resources, and extending services among clients.	Access control, service bus, workflow execution.	Database services including reporting and analysis.	Not the full application, just the engines for collaboration and sharing.	The business content engine only.

Azure operating system

An operating system for the cloud that includes storage, virtualization and a development environment. It also is home to the Fabric Controller, which views a data center as one pool of shared resources, and manages deployments, upgrades and configuration changes.

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[SPEAKERS AND AGENDA SUBJECT TO CHANGE]

IT Roadmap: Agenda for the Day

Not just compelling new technologies and state-of-the-art best practices, but how the pieces fit together to create an architecture that can drive business.

7:30 **Registration** and Complimentary Breakfast

8:15 **Welcome Address and Agenda for Action** Paul Desmond, Events Editor, Network World, Inc.

8:30 **Keynote Presentation:** The latest intelligence from the front-lines of IT's most successful CIOs

9:30 **Technology Keynote Presentation: *Strategic Role of the Network and Beyond*** Michael E. Marcellin, Vice President, Global Product Marketing – Verizon Business & Marie Hattar, Vice President, Network Systems and Security Solutions Marketing / CMO – Cisco Systems, Inc.

10:00 Refreshments Break

MORNING TRACKS (Choose One)

10:15 Each information-packed track presents a real-world user case study, vendor-specific solutions, and best practices you can take back to your enterprise

Virtualization	**VoIP, Video & Unified Communications**	**Network Management, Automation & Control**	**Securing the Core**	**Next-Generation WAN Services**
Andreas Antonopoulos, Nemertes Research	Irwin Lazar, Nemertes Research	Jim Metzler, Ashton Metzler & Associates	Joel Snyder, Opus One	Johna Till Johnson, Nemertes Research

12:30 Complimentary Lunch and IT Expo is Open

AFTERNOON TRACKS (Choose One)

2:30

Security and Compliance	**SaaS, Cloud Computing and Managed Services**	**Network & Application Acceleration**	**Enterprise Mobility**	**Data Center Infrastructure & Management**
Andreas Antonopoulos, Nemertes Research	Jeff Kaplan, THINKstrategies	Jim Metzler, Ashton Metzler & Associates	Craig Mathias, The Farpoint Group	Johna Till Johnson, Nemertes Research

4:45 **Reception and IT Expo** Take this opportunity to visit the expo hall and learn about the best in IT products and services. Refreshments will be served.

6:00 **Passport Drawing** Fantastic giveaways and other great prizes! You must be present to win.

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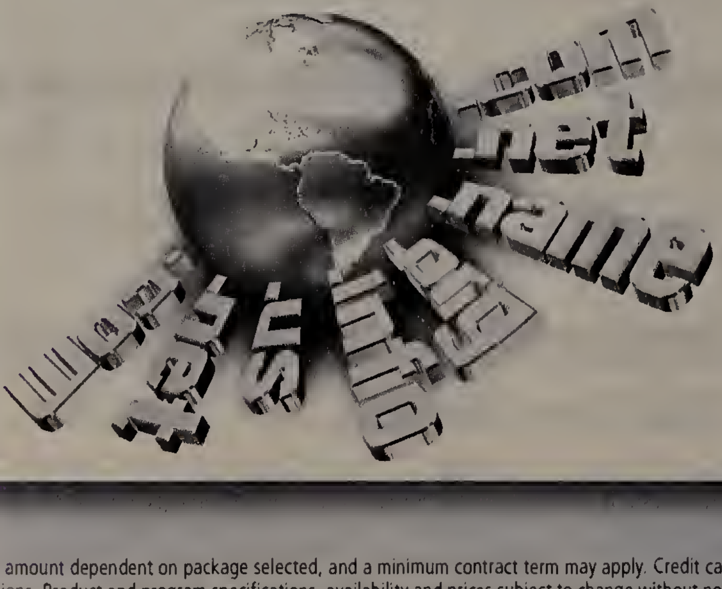

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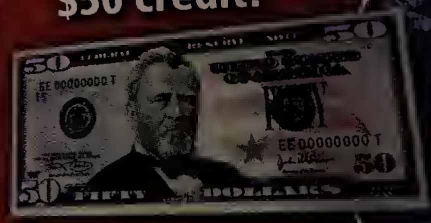

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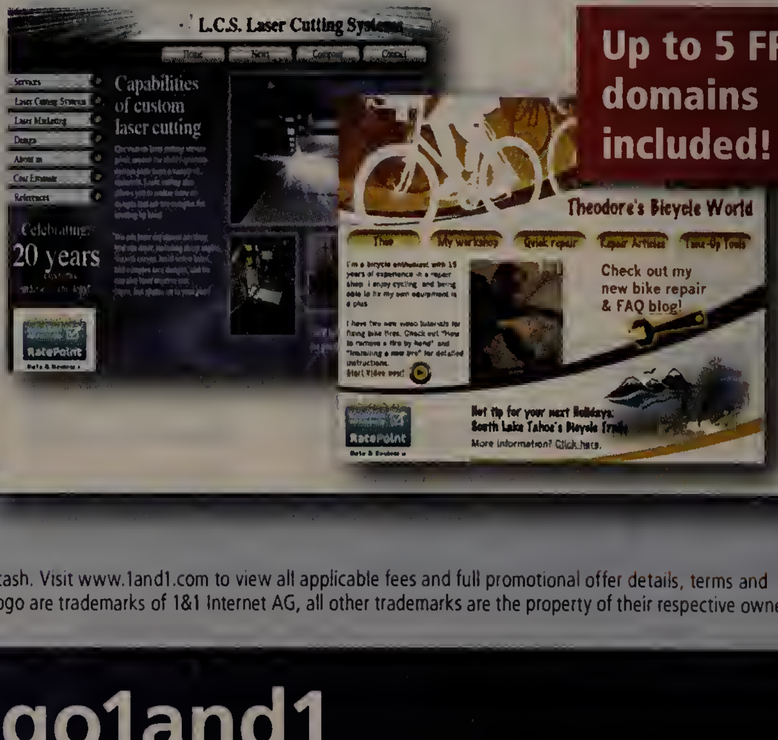
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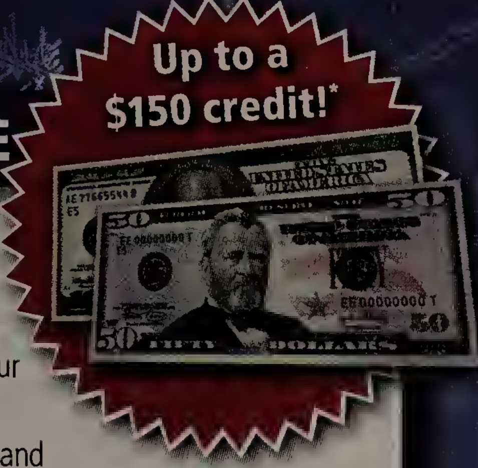
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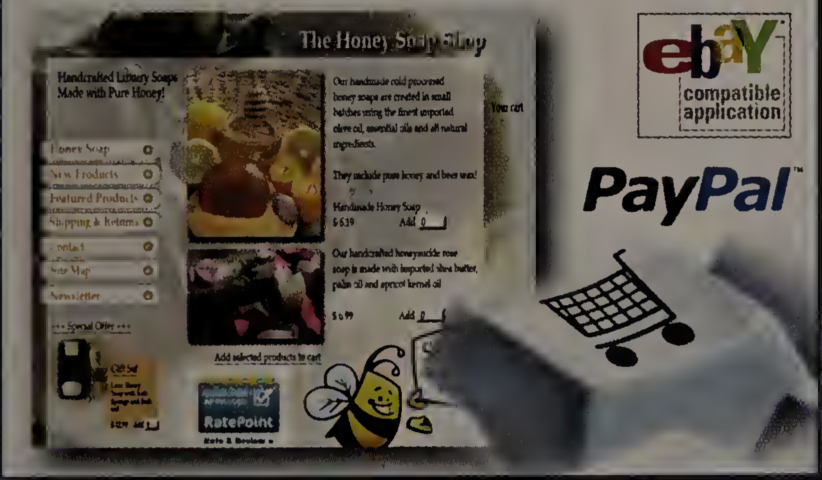

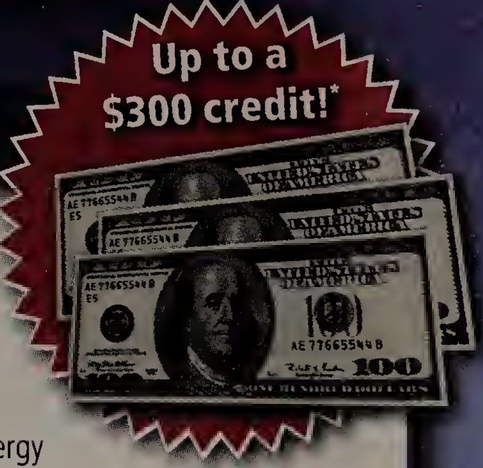
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Power efficiency only first step toward 'green' data centers

BY JON BRODKIN

Increased power efficiency alone won't be sufficient to turn data centers truly "green," Gartner said last week in advance of a major data center conference.

"If 'greening' the data center is the goal, power efficiency is the starting point but not sufficient on its own," Gartner analyst Rakesh Kumar said in a short research note. " 'Green' requires an end-to-end, integrated view of the data center, including the building, energy efficiency, waste management, asset management, capacity management, technology architecture, support services, energy sources and operations."

Legacy data centers are becoming obsolete, particularly when it comes to addressing environmental problems, Gartner said. More advanced power and cooling capabilities are needed to support data center equipment that is increasingly dense and power hungry.

"If they are not fully aware of the problem, data center managers run the risk of doubling their energy costs between 2005 and 2011," Gartner stated.

"If we assume that data center energy costs continue to double every five years, they will have increased 1,600% between 2005 and 2025," Gartner added.

IT should strive to build data centers that are like intelligent living organisms, heavy on modeling and measuring tools, running workloads where energy is less expensive, and addressing technical, financial and environmental demands while offering 99.999% availability, the analyst firm says.

Locations should be chosen strategically, Gartner says, noting that high-bay, warehouse-like buildings result in more efficient rack layout and airflow. Sites should be developed with modular components, incorporate recycling and alternative energy sources, HVAC systems and perhaps water cooling.

Monitoring tools are also crucial, for example to manage servers, moving away from an "always on" mentality, Gartner says.

"Data centers will become more energy efficient, be better for the environment and use emerging green IT products and processes. In essence, this living organism data center will be the green data center," Kumar says.

Gartner will provide more analysis on green data center trends, as well as topics like virtualization, storage, servers and IT operations during the first week of December at the analyst firm's 27th annual Data Center Conference in Las Vegas. ■

OpenFlow would allow test runs on live networks

BY TIM GREENE

Researchers can adjust network infrastructure to boost bandwidth, optimize latency and save power using an experimental technology called OpenFlow.

OpenFlow is in the proof-of-concept stage but could be used in business networks to engineer traffic, says Nick McKeown, an associate professor of electrical engineering and computer science at Stanford. OpenFlow was demonstrated last week at Global Environment for Network Innovations (GENI) Engineering Conference at HP Labs in Palo Alto.

OpenFlow is part of the Clean Slate initiative set up to consider how the Internet might be re-engineered to make it more responsive to how it is actually used.

Researchers devised OpenFlow as a way to test out new network protocols on existing networks without disrupting production applications. The only other option is to set up separate infrastructure on which to run experiments, a costly alternative.

OpenFlow lets users define flows and determine what path those flows take through the network — all without interrupting normal traffic. Policies can be crafted to find paths with certain characteristics such as more bandwidth, less latency and fewer hops so they use up less power, he says. OpenFlow could also be used to enable virtual servers to replicate themselves to other subnets because it can define paths without relying on IP addresses.

The technology consists of three parts: flow tables installed on switches, a controller and a proprietary OpenFlow protocol for the controller to talk securely with switches. For the purposes of OpenFlow development, Cisco, HP, Juniper and NEC have added OpenFlow to switches and routers being used in the project. OpenFlow is not generally available.

With the feature, flow tables are set up on switches. Controllers talk to the switches via OpenFlow Protocol, which is secure, and impose policies on flows. So, for example, a simple flow might be defined as any traffic from a given IP address. The rule governing it might be to route the flow through a given switch port. With its knowledge of the network, the controller could set up paths through the network optimized for speed, fewest number of hops or reduced latency, among other characteristics, McKeown says.

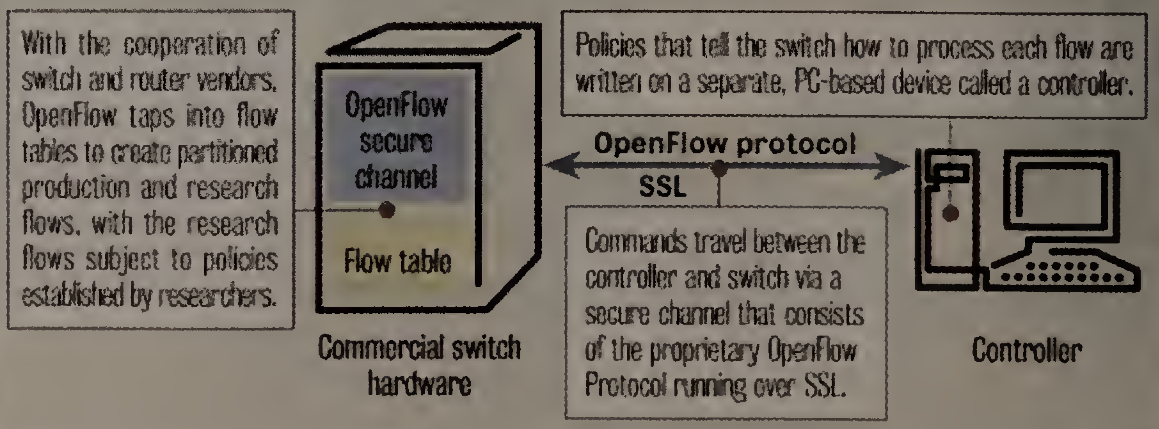
With current switches and routers, policies within them controlled by proprietary software determines the path traffic takes. OpenFlow can take control of how traffic flows through the network out of the hands of the infrastructure and put it in the hands of the network owner, individual users or applications.

Researchers demonstrating the feature used an experimental network between California and Japan. In the demo, players in both countries are playing a computer shooting game, and OpenFlow is being used to locate a virtual server on the network to minimize the average latency each player experiences.

In the demo, the game server is located on a virtual machine. Using OpenFlow, the virtual server copies itself to another physical server at the optimal location in the OpenFlow network to equalize latency, McKeown says. ■

OpenFlow switch architecture

The OpenFlow switch relies on standard switch hardware that is supplemented with software that carries out policies dictated by controller software running on a PC. This provides a means to run networking experiments on networks without disrupting production traffic. In addition, OpenFlow could become a traffic-engineering tool.



With the cooperation of switch and router vendors, OpenFlow taps into flow tables to create partitioned production and research flows, with the research flows subject to policies established by researchers.

Policies that tell the switch how to process each flow are written on a separate, PC-based device called a controller.

Commands travel between the controller and switch via a secure channel that consists of the proprietary OpenFlow Protocol running over SSL.

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Are taxpayer-funded networks a good idea?

NET INSIDER
Scott Bradner

There are few things that annoy a telephone or cable company as much as a town or city deciding to put up its own ISP infrastructure.

Every now and then, in spite of annoyed carriers, another municipality tries to figure how to make such an idea work. The latest to try — Palo Alto, Calif. — may fare as poorly as most previous U.S. cities and towns have, but if it manages to succeed, its approach could be a prototype for bringing high-speed Internet service to communities.

The goal of the Palo Alto plan is a new fiber network, with the city operating as a wholesaler and enabling 100Mbps connections for its homes and businesses. It's not a city-funded giveaway, however: Customers will have to pay (although I've seen no price estimates). And it's all at no cost to the taxpayers.

Palo Alto does not have a vendor signed up yet, and it may not find one willing to build the network. Even if it does, the venture may run into trouble, as other such endeavors have. Most big municipal-wireless plans have died because a business model was missing, and many previous municipal-fiber networks are in trouble or have been sold off.

For every failed implementation, however, numerous new efforts have been launched. In most cases, these are not just a case of unreasonable expectations but instead, an attempt by the municipality to survive when the local telco and cable companies refuse to provide good or cost-effective broadband services. Of course, as soon as a town announces a plan, it gets sued by the local telco to try to prevent competition for what the telco is not offering. Sometimes the announcement winds up pushing the telco into action, which can be a reasonable result if the price is rational.

The needs of, and problems with U.S. municipal fiber networks are explored in a good article on Telephony Online (www.nwdocfinder.com/7325). In too many states, municipalities do not have the option of seeing whether they could do better than the noncooperative telco because that same telco worked with the state legislature to outlaw such networks. There have been attempts in Congress to outlaw such restrictions, but none have succeeded yet. Still, I would not be surprised to see fresh attempts in the new Congress next year.

A great deal of the anti-network-neutrality rhetoric by incumbent carriers, both telephone and cable companies, is that they cannot afford to roll out new infrastructure if they cannot extort extra money from people to use the network. If that's the case, why not be open to letting someone else pay for the physical plant and just buy connectivity wholesale? A lot of the power system works this way — one company owns the physical wires and another provides the power.

Under this model, a municipality might be an ideal provider of wholesale service — a town or city can get low-cost loans to pay for it; and as long as the city is just providing dark fiber (or, as in some places in Europe, tubes to blow fiber through) rather than services, it will not get in the way of competition for higher-level services. Municipalities also can better understand their development priorities.

But don't hold your breath waiting for a logical outcome to this ongoing discussion.

Disclaimer: There is almost always logic behind what Harvard does, even if the distance behind varies. But I know of no university position on muni-owned infrastructure, so the above muttering is mine.

Bradner is Harvard University's technology security officer. He can be reached at sob@sobco.com.

How to sustain security on a tight budget

RISK & REWARD
Andreas Antonopoulos

Whether you believe we are in or about to enter a recession, IT budgets certainly are tightening up for 2009.

In a climate of uncertainty, CIOs are asking for across-the-board budget "constraint" until the uncertainty clears. Perhaps spending on operations is not being cut, but capital projects are being postponed unless they have a clear and short-term return on investment. Even then it may be difficult to get the initial investment approved. So, in this environment, what happens to security budgets?

Security spending has been increasing for most of the past decade. Our research has seen security budgets grow from about 2% to about 8% of IT budgets. With sustained investment in security, we also have seen a correlation in reported success. Companies that consistently have invested more than 5% of their IT budget in security report fewer challenges with malware, security breaches and identity theft. Sustained investment in technology, people and processes leads to increased security. In a time of constrained budgets, this type of consistent investment can carry a company through a period of cutbacks. Having developed operational processes and trained security and risk-management professionals, companies can reduce capital-intensive projects and maintain consistent levels of security for a short period of time. Of course, at some point capital investments have to resume, or companies will fall behind the technology-adoption curve and find themselves scrambling to catch up.

Companies that haven't invested in security at a sustained level above 5% of their IT budgets will find that scrambling to catch up is the norm. As budgets tighten, it will get harder and harder to keep up with new threats. Even so, there are ways to maintain security with less spending:

- Focus on training and awareness. Organize weekly or monthly security-awareness seminars, post security-awareness posters, print a brochure of security tips. Not only does training reduce unintentional employee security lapses, but by increasing employee awareness and vigilance, it also may lead to more problems being noticed early.
- Renegotiate license contracts. If you're hurting, so are the sales teams of security vendors. Now is the time to negotiate a better volume license. Shop around with your present vendor's competitors and ask them to offer pricing that will cover the cost of transition. Then turn that around as leverage with your current vendor. Ask for a discount for higher volumes or ask it to throw in one year's maintenance for free. We've seen vendors willing to do all these things.
- Investigate open source. There are many robust and sophisticated open source security solutions. If you have the skills to test, deploy and maintain these with community support, they're worth checking out. You can find good products in vulnerability analysis, monitoring, intrusion detection and prevention, firewalls, directory, identity management, and more. Many of these products also are available as virtual appliances that are easy to test and install.

Use your skills and acumen to find cost-effective solutions, and make the best use of your existing investments in technology, people and processes. Get your employees to help you improve security through training and awareness. In difficult economic times, good security professionals not only survive, they thrive.

Antonopoulos is a senior vice president and founding partner at Nemertes Research, an independent technology research firm. He can be reached at andreas@nemertes.com.

Inside Ethernet-fabric switches

BY JOSEPH AMMIRATO

Traditional approaches to data-center networking cannot satisfy the scale, bandwidth, latency and cost points required for evolving data-center software architectures.

Fibre Channel and InfiniBand remain costly because of the specialized knowledge required to implement, tune and administer them, while traditional Ethernet switches fail to meet architectures' stringent new demands. The best alternative is Ethernet-fabric solutions designed specifically for the modern data center.

An Ethernet fabric provides a low-cost, high-speed, ultra-low-latency, loss-less and scalable network infrastructure. It can offer a full cross-sectional interconnect for 1 Gigabit Ethernet or 10G Ethernet attached servers, and allows the compute and storage servers to maximize aggregate compute power in a cost-effective way. Its key attributes are:

- Scalability to hundreds of 10G Ethernet ports and thousands of 1G Ethernet ports.
- Nonblocking (wirespeed), full cross-sectional bandwidth.
- Loss-less packet delivery.
- Ultra-low latency (less than 6-microsecond latency across a multidevice core).

Conventional Ethernet networks have a multitier hierarchy, with bandwidth oversubscription in every tier. These networks typically are designed for Fast Ethernet and 1GB servers and clients, where 10GB often is used for interconnecting the Ethernet switches.

The spanning tree protocol is used for loop avoidance and active-standby resiliency. While spanning-tree accommodates a loop-free Layer 2 topology, it reduces the network's overall bandwidth efficiency because of the lack of readily available alternate paths. The reason: It takes many seconds to reconstruct the tree — even with the so-called rapid spanning tree protocol — rather than the few milliseconds required for it to be effective. Therefore, conventional Ethernet switches are not optimized for high-density 10GB interfaces.

Ethernet fabrics are based on a Clos architecture, also known as a fat-tree topology. Unlike traditional multitier Ethernet networks that oversubscribe 1GB or 10GB links to interconnect switches, Ethernet fabrics require that every switching tier be connected to the next tier closer to the root with higher aggregate bandwidth and without any over-subscription, guaranteeing a nonblocking switch fabric.

This can be implemented easily for 1GB links, but it becomes challenging for 10GB links. For 10GB server links, the aggregate capacity facing the root needs to be accommodated by a group of 10GB links. To assure nonblocking bandwidth, these groups cannot be blocked as they are in conventional enterprise Ethernet topologies.

So, Ethernet fabrics use high-capacity nonblocking 10GB switching nodes and employ Layer 2 multipath technology where all link capacity is available simultaneously to construct the fat-tree topology. Significantly, these switches utilize cut-through technology to maintain ultra-low end-to-end latency. As a result, this architecture enables full cross-sectional bandwidth through the Ethernet fabric, and the ability to scale nonblocking bandwidth with low latency is well beyond what is possible using today's traditional approach.

With an Ethernet fabric (see graphic), traffic flows are distributed across multiple Layer 2 paths based on traffic load for each path to maximize the fabric's bandwidth efficiency. The Layer 2 multipath technology in an Ethernet fabric distributes traffic on available paths using a dynamic rebalancing technique that assures optimal use of the aggregate bandwidth and guarantees ultra-low latency for all traffic flows.

The fabric not only dynamically rebalances traffic but also avoids congestion. Congestion can be caused by external traffic-load distribution or random traffic patterns where multiple sources send traffic simultaneously to the same destination. Congestion is detected and avoided inside the fabric using a dynamic avoidance technique (based on real-time, one-way latency plus jitter measurements) that detects congestion on any path and dynamically redirects the flow to an alternate, congestion-free path.

In the case of congestion at the destination, the Ethernet fabric can notify the source using standard Ethernet pause frames at the ingress port, thereby eliminating packet drops at the egress. The fabric can guarantee loss-less packet delivery. In contrast, rather than pausing the source of the traffic, traditional switches will pause neighboring switches creating a "congestion tree" in the network infrastructure.

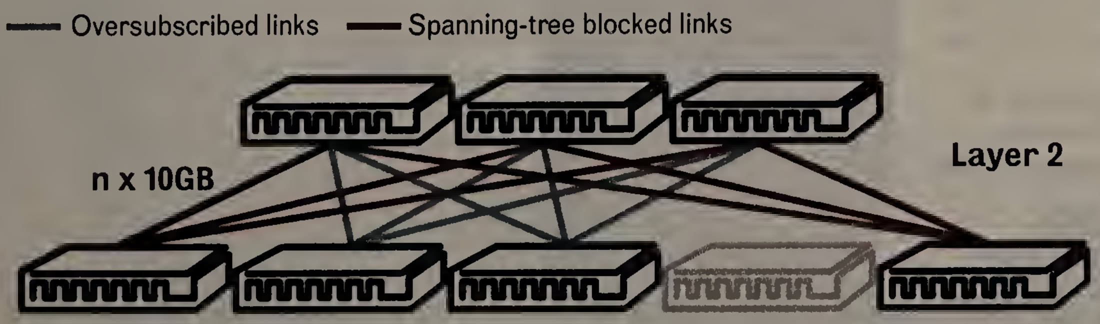
Ethernet fabrics are more cost effective than traditional Ethernet switches. A fabric's cost remains flat, whereas traditional switch costs rise dramatically when bandwidth is increased but the number of servers is kept constant, or when the number of servers is increased and bandwidth is kept constant.

To deliver the low-latency, nonblocking throughput, Ethernet fabrics must be able to establish multiple, alternate paths that can be utilized in real time to eliminate congestion. The best fabrics are able to perform this feat by dynamically selecting the path with the lowest latency and jitter without dropping or reordering any packets. Anything less is just an ordinary Ethernet switch.

Ammirato is vice president of marketing for Woven Systems (www.wovensystems.com).

Overcoming Ethernet limitations in the data center

Ethernet switches in a data center rely on oversubscribed links and are not optimized for high-density 10GB interfaces that are increasingly required. Ethernet fabrics use high-capacity nonblocking 10GB switching nodes and employ Layer 2 multipath technology where all link capacity is available simultaneously to construct a fat tree topology.



This vendor-written tech primer has been edited by Network World to eliminate product promotion, but readers should note it will likely favor the submitter's approach.

GEARHEAD
Mark Gibbs

Readers give DPC, cell signal advice

Remember my series of columns on the mysterious outbreak of deferred procedure calls that randomly occurred on one of my Windows XP machines? Just to refresh your memory, DPCs are Windows system calls that are deferred so the processor doesn't get tied up with work that isn't immediately required.

Out of nowhere the processor utilization caused by DPCs on my box jumped from a few percent to 40% to 50%, turning my PC into a boat anchor. The question was, why? What was causing this to happen? I never found an answer, and as mysteriously as the problem arrived it vanished.

While I was wrestling with the problem y'all suggested potential causes, including faulty hardware (couldn't find anything and I hadn't changed anything), a misbehaving driver (why would one suddenly start causing problems and then stop?) and bad ju-ju. I had several culprits of my own in mind, the most compelling being Microsoft's automatic update service, but the problem vanished before I could find any proof.

Reader Gary Lavery recently wrote to tell me about a similar mysterious problem in which something was chewing up cycles on his PC. Lavery says periodically his machine (a Dell Inspiron e9400 laptop with XP Pro and 2 GB RAM) would freeze and the disk light would go on solid for 30 to 60 seconds.

To find out what was up he turned to Glint System Monitor, a freeware stay-on-top system monitor. Glint showed disk reads were the problem, but what process was responsible? For that he turned to Microsoft's freeware FileMon for Windows: that "showed unbelievable open, query, close cycles on WCESCOMM.LOG."

Lavery found out the file belongs to Microsoft's ActiveSync. "I had installed [ActiveSync] to sync my phone remotely a long time ago, but it doesn't work when Outlook is hooked up over a VPN." So Lavery used the freeware Revo Uninstaller to remove ActiveSync and *voilà*! His PC immediately started to behave itself.

Now Glint "showed very little activity, whereas it had been lit up like a Christmas tree previously," Lavery says. "Filemon also showed very little activity, where before it had been overwhelmed with open, query, close cycles. These symptoms sounded similar to what you described for deferred procedure calls."

He noted that "the freeze always occurred the first time a file was deleted. If you kept deleting files — no freeze ups. But if you went on to other activities, then returned to Explorer to delete a file — freeze! Likewise, the first e-mail opened in Outlook would cause a similar freeze. But subsequent opens breezed through. But if you switched windows and returned to Outlook, the first e-mail opened would cause a freeze. In all cases, the disk light was on solid and it would be 30+ seconds before you got the PC back. There's a clear pattern here. And it was repetitive — not random. I could make the PC freeze at will."

There may be some relationship between what Lavery saw and my DPC problems, but I never noticed unusual file I/O activity.

Back to a more recent topic: The whole cellular reception issue I wrote about the past two weeks has generated interesting feedback.

Readers Jeremy Greenberg and (my favorite) A.N. Onymous wrote to tell me about a new Web site that lets users log their cell phone reception quality at any location and shows it on a map. The site is gotreception.com and it is a neat idea, although its usability isn't great. Worth checking out.

Gibbs loves his readers (in a manly way) in Ventura, Calif. Give him your help at gearhead@gibbs.com.

Keith Shaw

COOLTOOLS

Slacker: Great service, lousy device

The scoop: Slacker G2 Personal Radio Player, by Slacker.com, $200 (4GB) or $250 (8GB).

What it is: Before I get to the device, here's a quick description of the Slacker.com radio service. Like another Internet radio service, Pandora, Slacker lets users create personalized radio "stations" that play music that the user wants to hear. Slacker does a great job of linking similar songs together, and learning from the user whether a song is loved or not for future reference. The site has millions of songs available and more than 10,000 different "stations" created around specific artists. For example, you can listen to a '90s Alternative station, or get more specific and choose "Green Day" radio that plays their songs and other artists like them. The service is free through an ad-supported model, or you can pay for a subscription to the premium service ($8.99 per month or $7.50 per month if paid for a year of service).

OK, now for the device. The G2 Slacker Personal Radio Player is a small, handheld device that aims to re-create the Slacker experience, but in an iPod-like small audio player. With Wi-Fi connectivity, stations can be updated and refreshed, giving you the same experience when portable that you have when listening to Slacker at a PC. Great idea, but lousy execution.

The G2 was sent to me with some of my stations preloaded onto the device, and yes, it did replicate the experience of listening online. The problems came when I tried to update the device with new stations, or tried putting my own songs (the device supports a personal library of MP3 or WMA files) on the device.

The setup process, in which you download software and update the device via a USB cable and/or Wi-Fi connection, is agonizing. Software gets put into the Windows system tray, and doesn't really give you any directions about what's going onto the device or any sense of when the device has been updated. Because the process of updating took so long (it took more than two hours to update five stations), the device went into power-saving mode several times, requiring me to turn the machine back on to check the "status bar" to see if it was done. One attempt at trying to refresh stations via my Wi-Fi connection froze the device, with no way to shut off the G2 or reset it.

Adding my own MP3 files to the system didn't go any better. You have to synchronize files via Windows Media Player (which should raise several red flags), and in my tests, the device was never recognized by the Windows Media Player software or it crashed my system.

Slacker G2 Personal Radio Player

There's a good concept here — having a portable device that lets users listen to personalized stations — but the G2 is not that device for the moment. Slacker would serve its users better by focusing on creating software for other portable audio devices (like the iPod, iPhone or SD's Sansa devices) that can access the very good Slacker.com site and service.

Grade: Device: ★ (out of five). Slacker.com: ★★★★.

Shaw can be reached at kshaw@nww.com. Cool Tools videos and Twisted Pair podcasts available at www.networkworld.com.

DNS CHANGE MAKERS

LIU'S VIEW.

Mastering DNS has always been challenging – some would say it's as much art as science. And while I'm thrilled that DNS plays a key role in essentially all network applications, I'm concerned by current trends. We're now seeing more frequent attacks against DNS infrastructure. Recently, for example, we saw a spate of what are referred to as "DNS amplification" attacks in which open recursive name servers are used as amplifiers to swamp targets on the Internet. Turns out that name servers are terrific amplifiers – you can get an amplification factor of nearly 100x. These attacks have raised awareness of the vulnerability of Internet name servers, which is possibly the only positive result.

Dealing with DNS issues is becoming a full time job for organizations. My company, Infoblox, provides leading edge products to help IT managers better handle their DNS network management challenges.

When I need an answer fast, I go to a source I trust – DNSstuff.com. Comprehensive troubleshooting and problem solving tools in one place. That's powerful. Think all DNS tools are the same? Think again.

Cricket Liu, DNS guru, author & VP of Architecture, Infoblox

DNSstuff.com
WHEN GOOD ISN'T GOOD ENOUGH.

Bechtel

continued from page 1

is slashing its portfolio of software applications to simplify operations, as well as the user experience.

Dubbed the Project Services Network, Bechtel's new strategy applies the SaaS computing model internally to provide IT services to 30,000 users, including 20,000 employees and eventually 10,000 subcontractors and other business partners.

We operate "as a service provider to a set of customers that are our own [construction] projects," Ramleth says. "Until we can find business applications and SaaS models for our industry, we will have to do it ourselves, but we would like to operate with the same thinking and operating models as [SaaS providers] do."

Nicholas Carr, author of several books including *The Big Switch: Rewiring the World from Edison to Google*, calls Bechtel's strategy a smart move.

"For the largest enterprises, the very first step into the Internet cloud may well be exactly what Bechtel is doing: building their own private cloud to try to get the cost savings and flexibility of this new model," Carr says. "Large companies have such enormous scale in their own IT operations that the outside providers, the true utility providers, just aren't big enough yet ... to make them a better option."

Carr predicts, however, that Bechtel's do-it-yourself SaaS strategy will be an interim step until the company is able to outsource its IT infrastructure fully. That may take as long as 10 years, he adds.

"My guess is that over time — and maybe it will start with the HR system — Bechtel will look outside and start running some aspects of its IT operations off of [SaaS] sites," Carr says. "Then its cloud will start to blur with the greater Internet cloud."

Many enterprises are interested in the SaaS model for applications that don't differentiate them from their competition, says Bryan Doerr, CTO of utility computing provider Savvis.

"The move to SaaS is simply a different delivery model for an application that has little to do with intellectual property or innovation," Doerr says.

Business drivers for SaaS

Several business challenges are driving Bechtel's SaaS strategy.

Bechtel is a construction, engineering and project-management firm with 42,500 employees and 2007 revenue of $27 billion. The privately held company is working in an increasing number of far-flung locations, and it has difficulty finding and retraining talented employees to work on its projects.

Bechtel's employees are demanding business software that is as intuitive as popular Web sites. The company doesn't have time to train users in software applications, nor can it afford to maintain hundreds of applications.

"We needed a different way of doing applications and supporting them," Ramleth says. "We have more employees coming into the organization, and we need to get them up to speed fast."

Another key business challenge is protecting Bechtel's intellectual property when so many subcontractors and business partners have access to its network and data.

"A third of the people on our network are non-Bechtel employees. That exposure forms a security risk," Ramleth says.

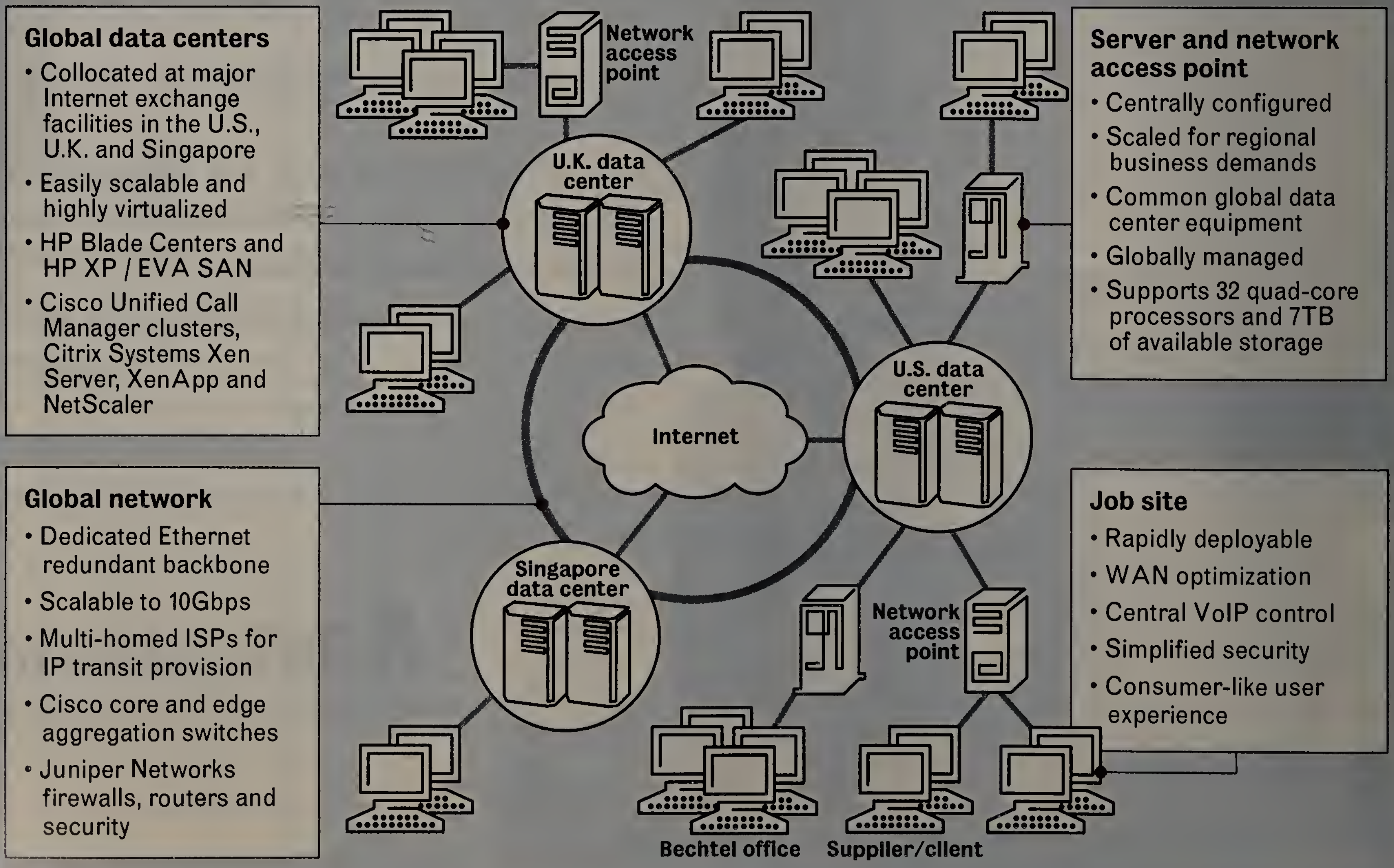
Bechtel started its transformation by trying to figure out how to revamp its software applications to operate more like leading Web sites. What Bechtel discovered, however, is that it had to fix the underlying IT infrastructure — including data centers and networks — before it could change its applications.

"Not only do you have to solve the IT architecture and the way you operate it, but you have to make sure that IT is accommodating Web applications that can operate more in an Internet mode than in an Intranet mode," Ramleth explains.

See Bechtel, page 30

Bechtel's global network

The worldwide construction company has consolidated from seven data centers three years ago to three new facilities with virtualized servers and storage linked by Gigabit Ethernet.



Global data centers

- Collocated at major Internet exchange facilities in the U.S., U.K. and Singapore
- Easily scalable and highly virtualized
- HP Blade Centers and HP XP / EVA SAN
- Cisco Unified Call Manager clusters, Citrix Systems Xen Server, XenApp and NetScaler

Global network

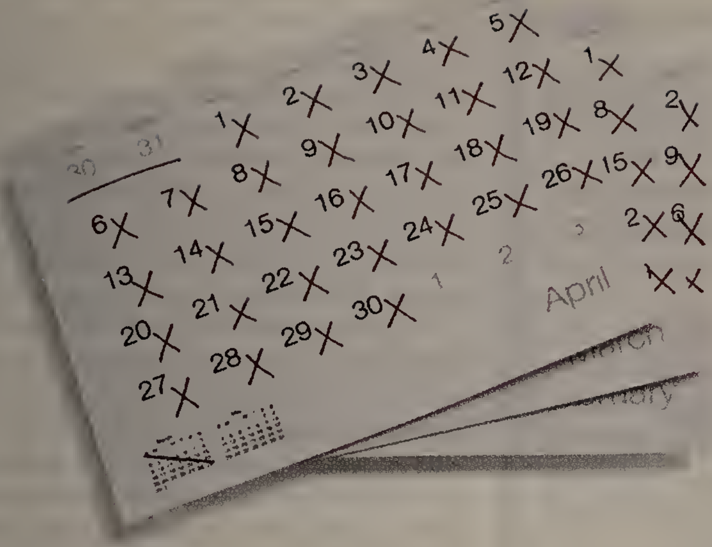
- Dedicated Ethernet redundant backbone
- Scalable to 10Gbps
- Multi-homed ISPs for IP transit provision
- Cisco core and edge aggregation switches
- Juniper Networks firewalls, routers and security

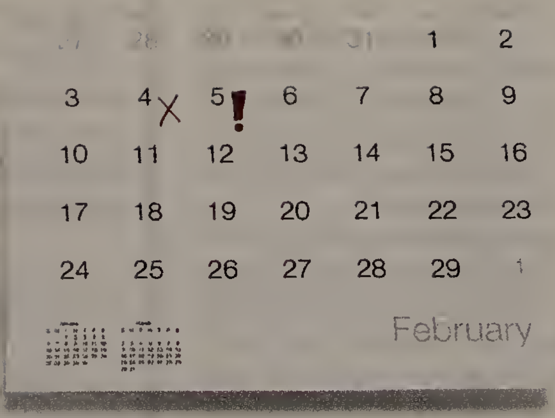
Server and network access point

- Centrally configured
- Scaled for regional business demands
- Common global data center equipment
- Globally managed
- Supports 32 quad-core processors and 7TB of available storage

Job site

- Rapidly deployable
- WAN optimization
- Central VoIP control
- Simplified security
- Consumer-like user experience





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Bechtel
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Perhaps most impressive is that Bechtel is transforming its IT operations without additional funding. Bechtel would not release its annual budget for its Information Systems & Technology (IS&T) group, but the company said it has 1,150 full-time employees in that group and 75 to 100 contractors.

"We've mostly paid for this by re-allocation of the budgets that we otherwise would have used for refresh and maintenance," Ramleth says. We're "doing a total change of the traditional way of doing things, and we have done it with very little, if any, incremental funding."

Benchmarking the leaders

The transformation began with the IS&T group spending a year trying to figure out how to drive faster adoption of such consumer technology as Google's and Amazon.com's across the company.

"We asked ourselves: If we started Bechtel today, would we do IT the same way we are doing it today? The answer was no. If we had a clean slate, we wouldn't do it the way we were doing it," Ramleth says. He decided to benchmark Bechtel's IT operation against leading Internet companies launched in recent years. He zeroed in on Amazon.com, Google, Salesforce.com and YouTube.

The IS&T staff studied the available information about how these Internet leaders run their IT operations, and they interviewed venture capitalists with experience investing in consumer applications.

Bechtel estimated how much money YouTube spends on networking, Google on system administration, Amazon.com on storage, and Salesforce.com on software maintenance. What Bechtel discovered was that its IS&T group was lagging behind industry leaders.

"What we found were tremendous discrepancies between our metrics and what these guys were dealing with," Ramleth says. "You can learn a tremendous amount from [companies] that have the privilege of starting recently."

When Bechtel researched YouTube, it concluded that YouTube must be getting much less-expensive network rates, because otherwise it wouldn't be able to send 100 million video streams a day for free. Bechtel estimated that YouTube spent between $10 and $15 per megabit for bandwidth, while Bechtel was spending $500 per megabit for its Internet-based VPN.

YouTube was "paying a fraction of what we were paying," Ramleth says. "We learned you have to be closer to the high-bandwidth areas and not haul the data away. We decided we better bring the data to the network, rather than bring the network to the data."

Next, Bechtel studied how Google's servers operated. Google had one system administrator for every 20,000 servers, while Bechtel had one for every 100 servers.

"What we learned is that you have to standardize like crazy and simplify the environment," Ramleth says. "Google basically builds their own servers by the thousands or gets them built in a similar fashion, and they run the same software on it. So, we had to get more simplified and standardized."

Study of Internet successes

Bechtel says the huge disparity between its IT infrastructure costs and setups and those of such Internet leaders as Amazon.com and Google has convinced it to make changes.

YouTube

YouTube could not send 100 million video streams a day for free if it paid Bechtel's original or even current network rates:

YouTube network rates*: $10 to $15 per Mb

Bechtel network rates: $500 per Mb

Google

Google could not provide free services running on several hundred thousand servers if it used Bechtel's metrics:

Google system-administration metrics*: 15,000 to 20,000 servers/one system administrator

Bechtel system-administration metrics: 100 servers/one system administrator

amazon.com

Amazon could not offer disk space for 5% of Bechtel's internal costs if it operated storage as Bechtel does:

Amazon storage rates*: $0.10 per GB per month

Bechtel storage rates : $3.75 per GB per month

salesforce.com

SalesForce.com could not upgrade its systems four times a year without downtime and customer disruption if it operated those systems as Bechtel does:

SalesForce.com*: one application

Bechtel: Approximately 800 applications, (230 applications x an average of 3.5 versions each).

*Bechtel estimate.

Bechtel studied Amazon.com and determined that it must have a better storage strategy if it was offering disk space for a fraction of Bechtel's internal costs. While Amazon.com was offering storage for 10 cents per gigabyte, per month, Bechtel's internal U.S. rate was $3.75 per gigabyte, per month.

Ramleth says the key to reducing storage costs was not only to simplify and virtualize the storage environment, but also to drive up use.

"Our average utilization was 2.3%," Ramleth says. With virtualization, "we now expect to have utilization in the 70% to 75% range." However, the new virtualized storage environment is "more complex to operate," he adds.

Bechtel turned to Salesforce.com for its expertise in running a single application with millions of users. In contrast, Bechtel operates 230 applications, and it runs 3.5 versions per application. That means it maintains approximately 800 applications at any given time.

"When you look at Salesforce.com, not only are they running one application, but they are running one version and they are only running it in one location," Ramleth says. "They upgrade that application four times per year, and they don't disrupt the users by having to retrain them. Every time we have a new version, we have to retrain our users."

With its benchmarking data in hand, Bechtel revamped its IS&T operations to model itself as closely as possible after the SaaS model pioneered by these four Internet leaders.

"If you take the ideal world, everything is done as a service: computing, storage, software and operations," Ramleth says. "It's maybe the ultimate goal . . . but if you start where all the enterprises are today, that's a very long road to go."

Once Bechtel committed to the software-as-a-service model, the firm realized it needed to revamp its data centers to copy Google's standardized, virtualized model.

Bechtel was operating seven data centers worldwide, but last year it replaced those with three new data centers, one each in the United States, Europe and Asia. The data centers have identical hardware from HP, Cisco, Juniper Networks and Riverbed Technology. On the software side, Bechtel is using Microsoft and Citrix Systems packages.

"The hardware is the same, the software is the same, and the same organization [is] managing all of them," Ramleth says. "It's like one data center, but it operates in three different locations."

The data centers have virtualized servers with utilization of around 70%, Ramleth says. These centers have the most energy-efficient design possible, so they are a fraction of the size of the old data centers and use significantly less electricity.

"In square footage, we're down by a factor of more than 10," Ramleth says. "Two-thirds of the power in a data center is chilling, and if I don't have to chill that extra space … I get a dramatic reduction in power needs."

The new data centers are operational, and Bechtel expects to close all the old data centers by the end of 2009.

Ramleth says one of the hardest aspects of the IS&T transition was closing data centers upgraded as recently as 2005.

"Six of our data centers were relatively modern. That was a tough thing. We finished a [data center] consolidation in 2005, and already in 2006 we started talking about doing a re-do of our data centers again. [Our IS&T staff] felt like they hadn't really gotten dry from the last shower before they started getting wet again," Ramleth says.

At the outset of its research project, Bechtel was operating an IP VPN that it had installed in 2003. To drive down the cost of its network operations, Bechtel has redesigned that network using YouTube's do-it-yourself model.

Bechtel has a Gigabit Ethernet ring connecting the three new data centers, with dual paths for failover. The company is buying raw bandwidth from a variety of providers — Cox Communications, AboveNet, Qwest Communications, Level 3 Communications and Sprint Nextel — but it is managing the network itself.

"We buy very little provisioned networking," Ramleth says. "We do it ourselves because ... it's less costly than buying from others.... We go to the Internet exchange points, to the carrier hotels, where the traffic terminates."

So far, Bechtel has migrated the three data centers to the new network, along with nine offices in San Francisco; Glendale, Ariz.; Houston; Oak Ridge, Tenn.; Frederick, Md.; London; New Delhi and Brisbane.

The new network "[costs] about the same as what we paid before, but it offers a heck of a lot more capacity," Ramleth says, adding that Bechtel is getting around 10 times more capacity for the same amount of money.

The biggest cost-saving of the new network design came from aggregating network traffic at Internet exchange points, which is what leading e-commerce vendors do, Ramleth says.

"We found that for the amount of traffic and the amount of capacity that we put it in, we could do it cheaper ourselves," Ramleth says. "This not something for a small or midsize enterprise, but we found that we were big enough to be able to do it ourselves."

Simple, secure software

The next aspect of transforming Bechtel's IS&T operations is migrating its applications to the new SaaS model.

Bechtel runs 230 software applications, 60% of which were developed internally. Ramleth hopes to have 20 to 30 of the firm's key applications converted to the SaaS model within a year, he says.

So far, Bechtel has a dozen applications running in its new data centers, including e-mail, a Web portal, a time-record system and a workflow/document-management application.

Bechtel's ERP applications, including Oracle Financials for accounting and SAP for human resources and payroll, will be moved to the new infrastructure by the end of 2009, Ramleth says.

"In the next six to nine months, we will be getting applications in and getting them certified in this new environment," Ramleth says. "The ones that we can't totally certify, a few we will let die. ... For the low usage, infrequently used applications that are not as critical, we are using Citrix solutions to solve some of them so we don't have to do too much with them. We're doing that as a bridge to get from our past to our new infrastructure."

Bechtel's new portal is key to its SaaS strategy and its goal of having software applications that are as simple as Google to use.

In its research, Bechtel found that 80% of its users want to get information out of an application but don't need to understand how it works. With the new Project Services Network Portal, Bechtel's users can interact with applications without requiring training.

Bechtel built the portal using Microsoft's SharePoint software. The portal "gives us consumerization and also gives us the new security model," Ramleth says.

Ramleth likens Bechtel's security strategy to Amazon.com's approach. With Amazon.com, users can browse freely and security is applied when a purchase is made. Similarly, Bechtel is trying to create Web applications that apply security only when needed.

"We will apply different forms of security based on what's going on," Ramleth says. "By using the portal, we can limit what you have access to by policy, by role, in a way where people won't necessarily go in and find [our intellectual property] without having the right to access it."

The new portal and the policy-based security model it provides are among the top benefits that Bechtel is gaining out of the IS&T transformation effort, Ramleth says. This benefit will be fully realized when Bechtel's business partners are migrated to the portal, too, he says.

The SaaS model allows us "to bring in a different cost model that can afford us to have a high-capacity, global, collaborative work environment," Ramleth says.

The risk for enterprises that don't start a SaaS migration strategy soon is that their IT organizational structures will be a competitive disadvantage, Ramleth says. "If they don't start thinking about this soon, the changeover in the future will be really hard." ■

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▶**What's next:** Looking forward to the BlackBerry Bold. **Page 36.**

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SMARTPHONES GET SMARTER, MORE PERSONAL

BY KEITH SHAW

No market has been hotter than the smartphone market. Pacesetters Research In Motion and Microsoft are battling to stay on top, PDA stalwarts Palm and HP are fighting to recapture market share, and two new powerhouses have jumped into the fray — Apple and Google.

Not only has the vendor landscape changed, but the products themselves also have evolved. No longer can (or should) a device be considered a business device only or a consumer device only — those distinctions have blurred. Today's smartphones pack as many consumer features (digital cameras, multimedia players, games) as business features (e-mail access, Office-document viewing, VPN access). It's a recognition that today's mobile worker is a 24/7 employee who needs access to personal data during the day and business data at night.

A recent survey conducted by Artificial Life confirms this. Its survey of 200 cell-phone users showed that 46% are using their devices for entertainment purposes. In addition, 87.5% of those who own a smartphone have accessed entertainment content, including music, games and videos. One-third of those surveyed prefer to use their cell phone for entertainment more than for any other purpose, including e-mail, GPS or Internet browsing.

With these trends in mind, choosing a device for employees can be a daunting task. Company policy regarding security and compliance is a concern, as well as being able to manage and configure these devices remotely and centrally. Controlling costs for services (can or should employees be allowed to download entertainment applications to the device?) is another factor to consider. These requirements may narrow your list, but such things as whether a device has a removable battery may save your help desk the cost of support when mobile workers call with a dead phone.

Here are reviews of six of the latest smartphones available for business users.

DEVICE: iPhone 3G ★★★★★

MANUFACTURER: Apple

CARRIER: AT&T

PRICE: $299 (16GB version); $199 (8GB version). Both require two-year contract, voice and data service plans.

OPERATING SYSTEM: iPhone OS 2.1.

CELLULAR NETWORK: UMTS/HSDPA, drops to GSM/EDGE when out of 3G coverage area.

WI-FI: Yes (802.11b/g).

DISPLAY: 3.5-inch widescreen, 480-by-320-pixel touchscreen.

NAVIGATION: No stylus or hardware; navigation through touchscreen.

E-MAIL: Support for Microsoft Exchange (works via Outlook Web Access), Yahoo, Gmail, AOL, and most IMAP or POP mail systems.

CONTACTS, CALENDARS, TASKS: Can be synchronized through Exchange.

OFFICE DOCUMENT SUPPORT: Can view (not edit) PDF, Word, Excel and PowerPoint files.

WEB BROWSER: Safari.

USE DEVICE AS PC MODEM: No

GPS: Yes. Maps application (integrated with Google Maps) includes list of turn-by-turn directions, or you can track route and view live position.

STORAGE CARD: No. Memory storage on hard drive (8GB or 16GB).

CAMERA: 2.0 megapixels with photo geo-tagging (integrated with GPS).

MULTIMEDIA: IPod application plays songs and music.

REMOVABLE BATTERY: No

THE SKINNY Enterprises shouldn't automatically dismiss the iPhone for mobile workers just because it's made by Apple. The company has made an effort with the second-generation iPhone to get into the enterprise, with such features as Exchange support, remote wipe and VPN access. Whether enterprises will bite is up to the individual company and how stringent its policies are regarding mobile devices. For example, the camera can't be disabled, and enterprise applications have to be custom-built through Apple's software developers kit or purchased through third-party applications in the App Store. Companies will find mobilizing their existing Windows applications for use on the iPhone more difficult than mobilizing them on other devices, where Windows Mobile integration with Windows is easier. The lack of a removable battery is a deal-killer with many mobile workers. Heavy use on the road will require additional accessories, such as snap-on battery packs or charging cables.

Despite these issues, the iPhone provides the best mobile user experience — the Safari browser best emulates a PC Web session — and being able to access thousands of third-party applications can turn the iPhone into the ultimate mobile device for work and for personal use.

See Smartphones, page 34

Connect your mobile users without disconnecting your PBX.

Move your mobile workforce over to VoIP using innovative software from Microsoft. Software that integrates with Windows Server® Active Directory® services, Microsoft® Office, and Microsoft Exchange Server. Keep your existing PBX hardware and still get new voice capabilities like drag-and-drop conferencing, anywhere access, and click-to-call functionality from familiar desktop applications. A software-powered VoIP solution, based on Microsoft Office Communications Server 2007, helps you increase the productivity and flexibility of your workforce—especially your mobile users. Empower your people with better connectivity, leave the PBX plugged in. Learn more at microsoft.com/voip

VoIP AS YOU ARE.

Your potential. Our passion.
Microsoft

Smartphones, continued from page 32

DEVICE: Treo Pro ★★★★½

MANUFACTURER: Palm

CARRIER: Unlocked GSM

PRICE: $549 (Carrier determines voice and data service costs).

OPERATING SYSTEM: Windows Mobile 6.1 Professional.

CELLULAR NETWORK: UMTS/HSDPA. Downgrades to GSM when out of UMTS/HSDPA coverage area.

WI-FI: Yes

DISPLAY: 320-by-320-pixel transflective, color touchscreen.

NAVIGATION: Five-way navigation for getting through menus, stylus and qwerty keypad.

E-MAIL: Outlook access with Microsoft Direct Push and HTML support (requires Exchange Server 2003 with Service Pack 2 or Exchange Server 2007). Supports Hotmail, Yahoo and Gmail personal e-mail.

CONTACTS, CALENDARS, TASKS: Through Office Outlook Mobile.

OFFICE DOCUMENT SUPPORT: Can edit native Word and Excel documents; open and view PowerPoint, PDF and zip files.

WEB BROWSER: Internet Explorer Mobile.

USE DEVICE AS PC MODEM: Yes

GPS: Yes. Additional service required for navigation and turn-by-turn navigation. TeleNav service bundled with device.

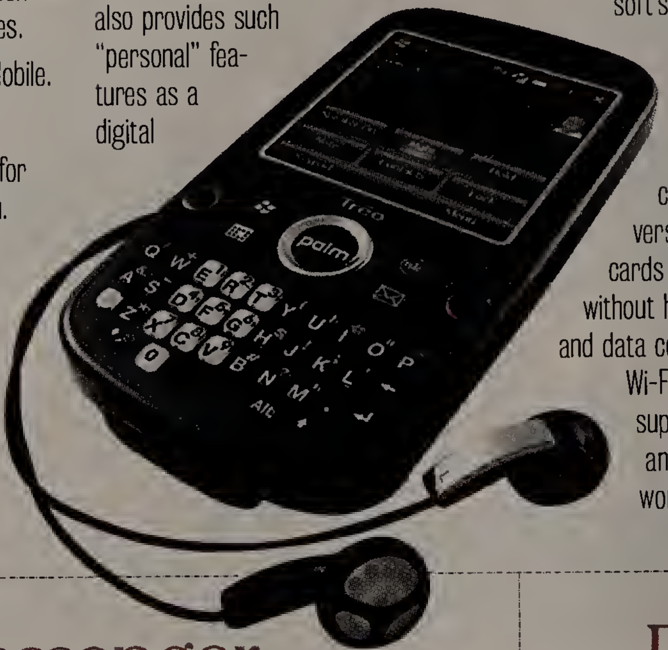
STORAGE CARD: MicroSDHC supported, up to 32GB.

CAMERA: 2.0 megapixels, with 8x digital zoom and video capture.

MULTIMEDIA: Windows Media Player Mobile.

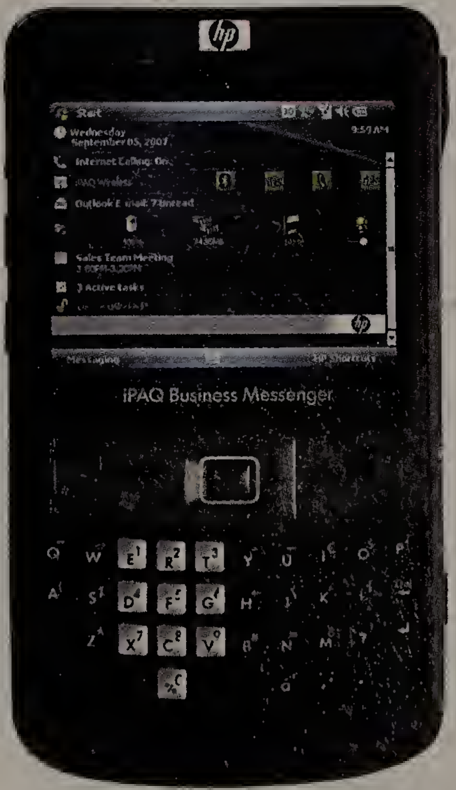
REMOVABLE BATTERY: Yes

THE SKINNY Palm's latest smartphone provides support for most enterprise functions (including the ability to encrypt data stored on the phone), but also provides such "personal" features as a digital camera and multimedia player. Mobile workers will appreciate being able to remove the battery and being able to edit Word and Excel documents while on the road. Because the device uses Windows Mobile 6.1, applications based on Microsoft's .Net Compact Framework 2.0 and SQL Server 2005 will run on the device. The price is a bit high, so enterprises might want to wait until a carrier provides a subsidized version (although users with SIM cards who want to switch can do so without having to extend their voice and data contract). This device includes Wi-Fi for faster data access; GPS support provides for local search and driving directions for mobile workers.



DEVICE: iPAQ 910c Business Messenger

★★★★



MANUFACTURER: HP

CARRIER: Unlocked, but rumors have swirled about AT&T supporting the device.

PRICE: $499 (unlocked). **OPERATING SYSTEM:** Windows Mobile 6.1 Professional.

CELLULAR NETWORK: HSDPA, drops to GSM/GPRS/EDGE when out of HSDPA coverage area.

WI-FI: Yes (802.11b/g). **DISPLAY:** 2.46-inch, 320-by-240-pixel touchscreen.

NAVIGATION: Five-way navigation, stylus and qwerty keypad.

E-MAIL: Supported through Outlook Mobile application.

CONTACTS, CALENDARS, TASKS: Synchronized through Microsoft Outlook Mobile.

OFFICE DOCUMENT SUPPORT: Through Office Mobile (Word, Excel, PowerPoint).

WEB BROWSER: Mobile Internet Explorer.

USE DEVICE AS PC MODEM: No. **GPS:** Yes, with Google Maps application.

STORAGE CARD: MicroSD card slot, up to 4GB of capacity supported.

CAMERA: 3-megapixel digital camera.

MULTIMEDIA: Windows Media Player. **REMOVABLE BATTERY:** Yes

THE SKINNY It's been a while since the iPAQ brand name has been in the minds of smartphone users, but with the HP iPAQ 910c Business Messenger, HP is hoping it will return to the forefront for business users. The device, backed by the support of the Windows Mobile 6.1 operating system, is clearly in the enterprise category, but still has such personal features as a 3-megapixel digital camera and Windows Media Player for music and videos. The device is slightly bigger than today's smartphones, but that leaves room for the slightly larger screen and qwerty keypad — typing on the screen wasn't as harrowing as on some smaller devices. The integrated GPS and associated Google Maps application added very nice mapping features. Like other Windows Mobile-based devices, it integrates well with existing Windows applications; and users should be very familiar with its look and feel if they've used Windows Mobile (or even the old-school Pocket PC) devices before.

Like some other unlocked devices, the iPAQ's lack of specific carrier support concerns me (the unlocked phone drives up the price of the device, but you're not locked into a two-year agreement). Overall this is a pretty solid device — nothing to get super-excited about, but nothing that's a big deal-breaker either.

DEVICE: E71

★★★

MANUFACTURER: Nokia

CARRIER: None yet (unlocked), but rumors suggest AT&T Wireless in North America.

PRICE: $439 (unlocked version).

OPERATING SYSTEM: Symbian OS 9.2, S60 3.1 Edition (E-Series).

CELLULAR NETWORK: HSDPA, Wideband

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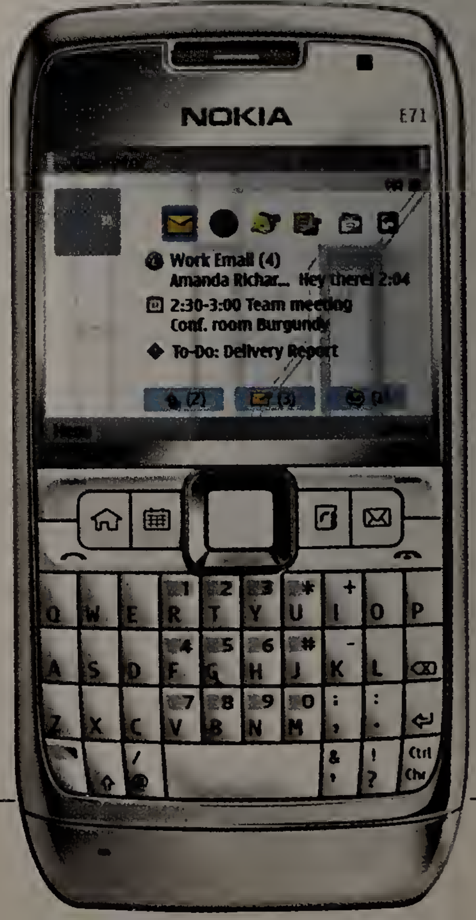

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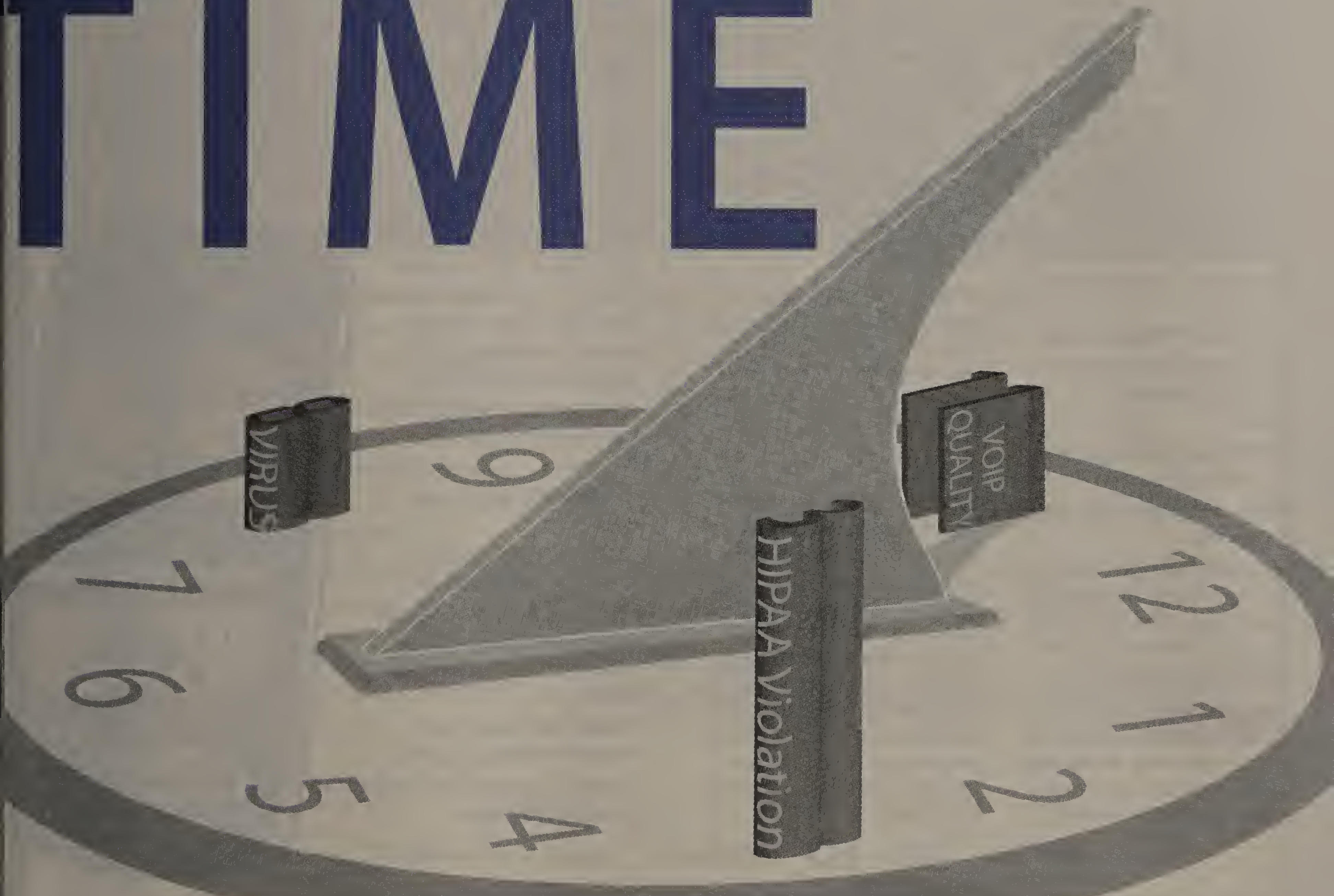

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CDMA 850/1900MHz, and quad-band EGSM (850/900/1800/1900MHz).

WI-FI: Yes (802.11b/g).

DISPLAY: 2.36-inch display, 320-by-240-pixel resolution (QVGA), with two customizable home screens. No touchscreen.

NAVIGATION: Five-way navigation and option-selection buttons, no stylus, qwerty keypad.

E-MAIL: Supports IMAP, POP, SMTP e-mail. Corporate e-mail supported through Mail for Exchange application.

CONTACTS, CALENDARS, TASKS: Through Mail for Exchange software.

OFFICE DOCUMENT SUPPORT: Documents, spreadsheets and presentations can be viewed and edited. PDF documents can be viewed.

WEB BROWSER: Nokia browser supports HTML, Wireless Application Protocol 2.0 and JavaScript.

USE DEVICE AS PC MODEM: Through Nokia PC Internet Access application.

GPS: Through Nokia Maps application.

STORAGE CARD: MicroSD card support, up to 8GB of capacity.

CAMERA: 3.2-megapixel digital camera with video mode.

MULTIMEDIA: Nokia-based music player, video player support flash video files (among others). Music can be synchronized through Windows Media Player.

REMOVABLE BATTERY: Yes

THE SKINNY The best representation of the idea that mobile devices are designed for business and personal use is the dual-home-screen feature on the Nokia E71. By pushing the "switch mode" button, E71 users can switch between their business e-mail and personal e-mail, for example, as well as such other options as a music player, Web browser and digital camera.

Security features include support for SSL, IPSec VPNs, and Check Point Software's Pointsec file-encryption. The E71 includes a Symantec firewall and antivirus software, and has a remote lock and memory-card password for additional security. IT managers can use Nokia's configuration tool and Intellisync Device Management to configure, manage and update devices. Enterprises comfortable with Symbian operating-system devices can use the operating system to create field service management, salesforce automation and GPS applications.

I do have a few concerns about the device and with Nokia's support of corporate applications. First, the device is unlocked now, and some enterprises might want better carrier support. It can still be used on AT&T's network, for example, but users won't be able to buy the device subsidized from the carrier (some may argue that this is better, anyway, and keeps you away from new two-year agreements). Second, Nokia recently announced it was going to stop its development of the Intellisync mobile e-mail platform and would develop platforms from Cisco, Microsoft and IBM instead. In addition, it announced it was reallocating resources to a consumer e-mail push service (the Nokia Email Service) that will aggregate messages from Gmail, Yahoo and ISP accounts directly into the phone.

DEVICE: Treo 800w ★★

MANUFACTURER: Palm

CARRIER: Sprint Nextel

PRICE: $249.99 (with two-year agreement, after rebates), plus voice and data service.

OPERATING SYSTEM: Windows Mobile 6.1 Professional.

CELLULAR NETWORK: EV-DO Rev. A.

WI-FI: Yes (802.11b/g).

DISPLAY: 320-by-320-pixel transflective touchscreen.

NAVIGATION: Five-way navigation for menus, stylus provided and qwerty keypad.

E-MAIL: Outlook access, Direct Push through Exchange (requires Exchange Server 2003 with SP2 or Exchange Server 2007). Internet e-mail, including Gmail, MSN and Yahoo, supported.

CONTACTS, CALENDARS, TASKS: Microsoft Office Outlook Mobile.

OFFICE DOCUMENT SUPPORT: Word, Excel, PowerPoint mobile versions, and PDF viewing.

WEB BROWSER: Mobile Internet Explorer

USE DEVICE AS PC MODEM: Yes (appropriate service plan required).

GPS: Sprint Navigation service bundled on device; GPS-powered local search, maps and navigation available from Today screen.

STORAGE CARD: MicroSD and microSDHC supported (up to 8GB).

CAMERA: 2.0 megapixels, with 2x digital zoom and video capture.

MULTIMEDIA: Windows Media Player Mobile, Sprint TV.

REMOVABLE BATTERY: Yes

THE SKINNY Sprint's speedy EV-DO Rev. A network provides better downloads of e-mail and Web access when mobile workers are out and about, and the Wi-Fi access comes in handy when they're within range of a Wi-Fi network. Enterprises should appreciate the Exchange support and Office document integration. Because the device uses Windows Mobile 6.1, applications based on Microsoft's .Net Compact Framework 2.0 and SQL Server 2005 will run on it.

WHAT'S NEXT? Bold and the beautiful from BlackBerry

BY KEITH SHAW

Astute readers may notice that I left out the major player in the smartphone game: Research In Motion and its BlackBerry line of devices. I could have profiled existing devices (such as the Curve, 8800 series or even the Pearl line), but they seemed "old" compared with the newer devices we tested. And the newest RIM product — the BlackBerry Bold — wasn't shipping in the United States when our testing was being conducted.

AT&T and RIM have announced that the Bold will be available Nov. 4 for as little as $299 (with a two-year contract and mail-in rebate). The Bold is the first BlackBerry to support HSDPA networks, and comes with integrated GPS and Wi-Fi (802.11a/b/g) and multimedia features. Running on a 624MHz mobile processor, the Bold includes

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Want to see your name added to this list? Call Andrea D'Amato at 508/766-5455 or adamato@nww.com to learn about sponsorship opportunities and benefits!

DEVICE: Touch Diamond smartphone ★

MANUFACTURER: HTC America

CARRIER: Sprint Nextel

PRICE: $249.99 (with two-year agreement, rebates).

OPERATING SYSTEM: Windows Mobile 6.1

CELLULAR NETWORK: EV-DO

WI-FI: Yes

DISPLAY: 2.8-inch touchscreen

NAVIGATION: TouchFLO 3D technology offers one-touch finger control to access programs. Buttons on the bottom of the phone let you navigate through menu options and access the home page or make phone calls.

E-MAIL: Outlook e-mail with Microsoft Direct Push technology, as well as access to POP3 and IMAP e-mail, including AOL, Gmail, EarthLink and Yahoo.

CONTACTS, CALENDARS, TASKS: Synchronized through ActiveSync.

OFFICE DOCUMENT SUPPORT: Through Office Mobile.

WEB BROWSER: Mobile Internet Explorer.

USE DEVICE AS PC MODEM: No

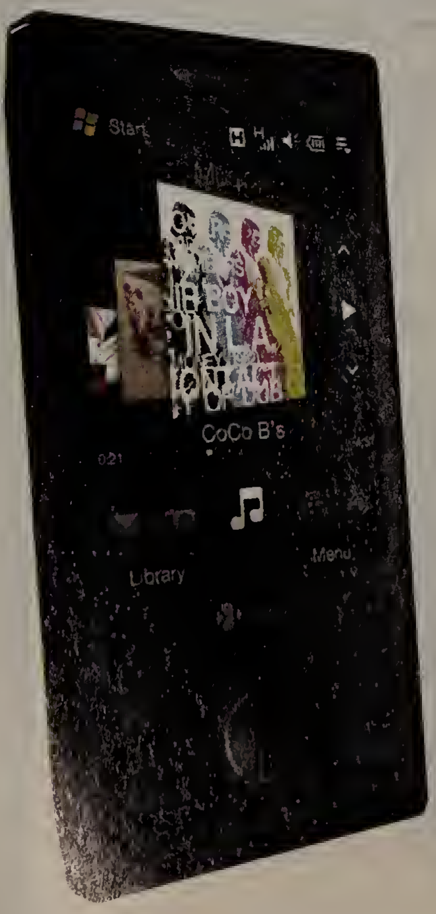
GPS: Yes, with Sprint Navigation application. Live search via GPS also supported.

STORAGE CARD: No, files stored on internal 4GB hard drive.

CAMERA: 3.2-megapixel digital camera.

MULTIMEDIA: Sprint Music application plays over-the-air downloads from Sprint Music Store; other applications can be side-loaded (via USB connection) through ActiveSync and Windows Media Player.

REMOVABLE BATTERY: Yes



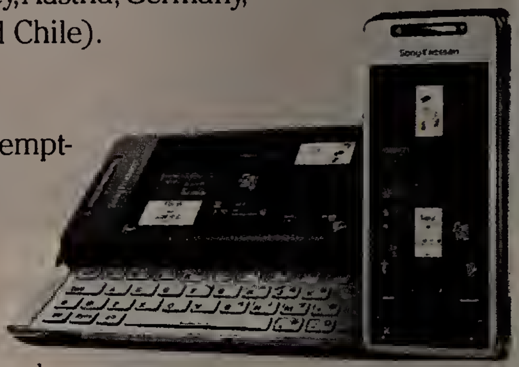
THE SKINNY At first glance, the HTC Touch Diamond is a very nice-looking phone, and seems to emulate all the cool features of the iPhone, including a touchscreen interface, slick music player, digital camera, GPS and a circular button at the bottom of the phone. A deeper look, however, reveals some fatal flaws: The core Windows Mobile operating system seems to be getting in the way, and hinders many of the nicer features. For example, the TouchFLO technology lets you access programs and some menu items with your fingers, but for other options, you have to press one of four buttons at the bottom of the phone — or hope that your big finger hits the right tiny button on the screen. I kept forgetting that I had to press the buttons on the bottom of the device; because there's no physical button (the interface is flush), I kept thinking they were touch-enabled, as they are on the LG Electronics Chocolate series. Only after a few presses did I remember I had to push down on the icon to activate it. In addition, like most Windows Mobile phones, this device comes with a stylus, so half the time I was trying to figure out whether I should use my finger or the stylus.

Because the device runs on Windows Mobile, you get the Microsoft-endorsed applications that will let you do such things as access Exchange e-mail, Office documents and Windows Live search; but you're also stuck with the Mobile Internet Explorer browser. In addition, you have to use ActiveSync to move music over to the device, and that requires Windows Media Player 10 on your desktop. In the end, the Touch Diamond is stuck between two worlds: It wants to be a hip, iPhone-like device, but it's stuck with a "serious" operating system that limits its ability to be cool and new. Serious hardware flaws and interface designs only make this device even more frustrating to operate.

Smartphones, continued from page 36

128MB of flash memory, 1GB of onboard storage memory as well as a microSD/SDHC card slot, which is accessible via the side (earlier BlackBerry devices hid the card slot behind the battery case). The Bold has a half-VGA color screen (480-by-320-pixel resolution), with a trackball that better mimics a mouse to make it easier to navigate and view Web sites. The Bold includes a 2-megapixel digital camera with video-recording features, built-in flash and digital zoom. Multimedia features include a music and video player.

Since being announced in May, the Bold has appeared practically everywhere on the planet except in the United States (you can get one in Canada, the United Kingdom, Japan, Indonesia, Spain, Serbia, India, Romania, France, Luxembourg, Malaysia, Singapore, Ecuador, Turkey, Austria, Germany, Australia, Hong Kong and Chile).



The Xperia experience

Another smartphone attempting to pretty up Windows Mobile is Sony Ericsson's Xperia X1 device, which made its official debut in September in the United Kingdom, with launches in Germany and Sweden as well. It's expected to appear in other markets in Europe, Asia and Latin America before year-end. The company said availability in North America "will be announced by local markets in the coming months." The X1 is a converged "entertainment and mobile Web communication experience," and includes an arc-slider design, 3-inch touch widescreen and Windows Mobile. Users can tap on the customizable panels to choose programs including checking e-mail, browsing online, or enjoying music or videos. The X1 includes a full qwerty keyboard for messaging, 3.2-megapixel digital camera (with video recording), Internet Explorer and Opera 9.5 browsers, assisted GPS and wireless-LAN capabilities. It can access HSDPA networks, and will include a microSD card slot for memory storage.

T-Mobile launches Android-based phone

The newest kid on the block is the T-Mobile G1, which includes the open source Google Android operating system (based on Linux). Launched in late October for $179 (with the requisite two-year agreement), the G1 made a big splash in New York in September. Like the iPhone, the system can access high-speed data networks (T-Mobile's HSPA or Wi-Fi), has a touchscreen for navigation and an HTML browser with zooming features. The "Android Market" promises users can add applications to the phone à la the iPhone App Store, and Google is hoping that the open source nature of the operating system will stimulate lots of application development. One big question mark about this phone is its lack of support for Exchange e-mail, but T-Mobile says that third-party development of such support is likely.

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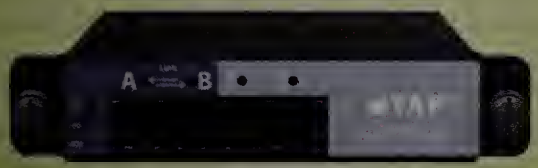

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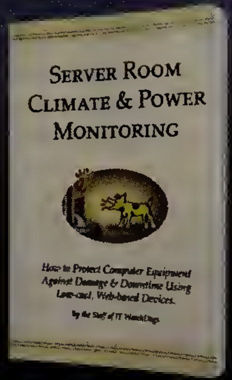

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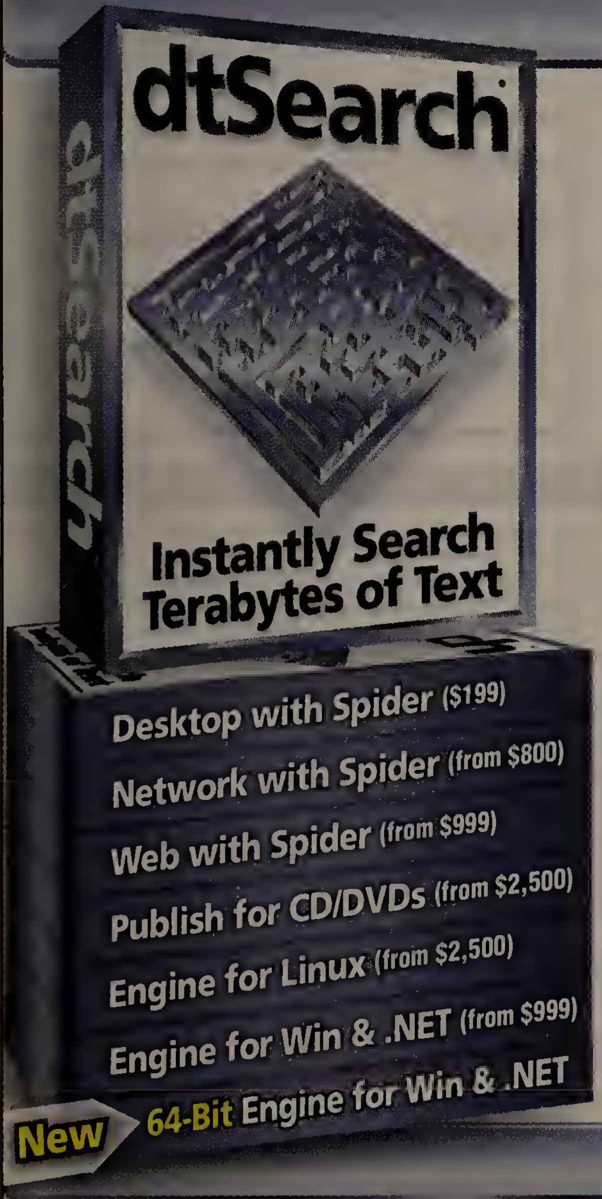

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NEWS ANALYSIS

Higher ed debates open source

BY JOHN COX

ORLANDO — The concept of open source software seems so firmly entrenched in higher education that it comes as almost a shock to realize there's actually a debate over it. But debate there was, civilized and trenchant, last week during the annual Educause conference on high technology in higher education.

"It's really tough to take [commercial software] systems built for a corporate world and stick them into an education world," said Bradley Wheeler, vice president for IT and CIO at Indiana University, adding that one recent book estimated education globally would spend $5.5 billion installing ERP, much of it in modifying commercial software to meet institutional needs. "We spend so much money trying too hard [to] fit those things in."

"I don't think there's any reason to believe that we will substantially match our business [with a community-source project] any better than a commercial system," countered Adrian Sannier, university technology officer and professor of computing studies at Arizona State University (ASU). "The CIOs of oil companies don't say 'our business is so different from everyone else's, [that] we have to write our own financial applications.' They're doing everything they can to get out of that business."

Colleges and universities have launched several high-profile "community source" projects to develop large-scale education applications. These include the Sakai learning-management system, and more recently, the Kuali project, which is creating such education-focused enterprise applications as financial accounting, and expanding to develop student information systems and even middleware to unite them.

Community-source uses the same basic licensing mechanism, rooted in the Apache project, as many other open source efforts. It adds a critical licensing change, however, to protect certain kinds of patents that might be held by software donors, and organizes code development along traditional, scheduled release dates.

Higher education takes open source seriously. Two years ago, BlackBoard, a leading commercial learning-management system, announced it had been awarded a patent for some elements of its learning-management system and intended to enforce it. The news ignited a blaze of criticism, with institutions and organizations like Educause criticizing the vendor for claiming technology and ideas that had been developed through the work of the community.

Wheeler and Sannier had begun their debate a year earlier, when they met at a dinner hosted by Campus Technology, a publication and online news site. This week, even their styles of dress seemed designed to highlight their different viewpoints. Sannier sported a brimmed cap and a pullover, while Wheeler was almost formal in tie and jacket. "I'm Mac, he's PC," Sannier joked at one point.

"I've got three Macs at home, baby — three Macs," Wheeler countered.

Sannier is a popular speaker at such events: working without notes, expressive, at ease, quick-witted. Wheeler may have lacked his opponent's rhetorical polish and flourishes, but met his arguments head-on.

Commercial software development by multibillion-dollar companies is a kind of virtuous spiral, Sannier argued: competing for business and customer satisfaction, leveraging what he called the new "industrial model" of efficient and fast software development to introduce a constant stream of innovations and ever more secure and efficient code. Community-source projects for such standard applications as financial accounting can't help but remain an inefficient, underfunded cottage industry, he said.

"It makes sense. Until you realize the fallacy of it," Wheeler replied. "By the time you pay the [commercial] license fees, you're in a monopoly situation with that vendor. And the values [of vendor and education customer] then diverge," he continued.

A small group of commercial vendors inevitably and effectively "monopolize" an institution's application when one product is installed, Wheeler argued. They then have wide power to raise prices and resist costly product changes because they have a "moral responsibility" to earn a profit for their shareholders and because it's too costly for institutions to change ERP vendors. When Indiana University's student population increased just over the number for one licensed product, the vendor forced a costly license upgrade.

"Brad, I can't help you with your skill, or lack of skill, in negotiating contracts," Sannier said. "There is nothing special about higher-education financials unless we make it so."

Institutions should forget open source attempts to replicate applications like financials, and instead concentrate on applications that are central to the core mission of the school, such as learning management and student information systems, Sannier insisted.

"We've learned that by investing in [our] software design, you're paring down your installation and operational costs," Wheeler said.

Those savings will be consumed by the consulting fees paid to deploy community-source enterprise applications, Sannier predicted. "The consultants who help you are like bartenders serving drunks."

Both men agreed about the importance of the rise of information services hosted by cloud-based providers. ASU was one of the first to work with Google to outsource student e-mail to Google's online Gmail service, and Indiana followed that lead. "But there are some areas where we should build it ourselves and own it, or own the data but contract it to a hosted service," Wheeler said.

"I found a lot of truth in both sides," said Brian Bennett, a Carnegie Mellon University IT staff person, who's just taken the new title and full-time job of documentation and training coordinator for the community-source Kuali Student project.

Bennett agrees with Sannier that IT often is tempted to overemphasize its industry's special requirements. But he also agrees with Wheeler that software vendors can display predatory, monopolistic practices once entrenched as the vendor-of-choice. "With community-source [software], no one will pull the rug out from under you," he said. ■

ONLINE: More from Educause

Read an interview with Educause President Diana Oblinger.

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Periodical postage paid at Framingham, Mass., and additional mailing offices. Posted under Canadian International Publication agreement #PM40063731. Network World (ISSN 0887-7661) is published weekly, except for combined issues for the first two weeks of July and the last two weeks in December by Network World, Inc., 492 Old Connecticut Path, Framingham, MA 01701-9002.

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BACKSPIN

Mark Gibbs

Customer service at its finest

Many of you work in enterprises that offer customer service. You may not be directly involved, but do you ever think about the quality of those services, how they represent your company? Do you care about whether they make your company look good?

Let me tell you a customer service story: My wife and I both have the same type of cell phone — the Motorola Razr v3.

Recently my wife's phone, which had been replaced because of a cracked screen, started to shut down randomly, so I filed an insurance claim. They send you a replacement and you return the defective phone. We had opted for insurance so the replacement both times was done by Asurion Corp., the sole insurer offered by our miserable cell service provider, T-Mobile.

Let me digress and note that despite two columns that were critical of T-Mobile's service that were also syndicated in *The New York Times*' Technology section, I've had no responses from T-Mobile management or their PR people. I'm torn between being surprised and not being hardly surprised at all.

Anyway, through a series of events too complex to go into, I accidentally returned the wrong phone (remember, they are identical). Some days later I realized the error and called to straighten things out.

The customer disservice rep I spoke to seemed to have remarkable difficulty understanding the problem so I asked for a supervisor and, of course, I got one of those unsympathetic, passive aggressive people who verge on rude and whose job it is to wear you down so you will just go away.

The supervisor informed me that the phone had most likely been received and stripped and/or trashed. No, I could not get the phone back and as the expected phone had, according to their systems, not been received yet, I would be charged for the missing return unless I did return it.

I pointed out that, yes, it was all my fault but as they logged all incoming serial numbers couldn't they confirm that a phone had been received, tell their system to not charge me, and help me out? No, that wasn't possible so I would have to return the correct phone. And be out a phone? Yes. And they couldn't do anything at all? No. Really? Yes.

And that was that. There have been many times when I've received less than stellar customer service but this was world class.

Obviously this supervisor didn't want to help me, but even when the CSR or supervisor does care they often can't do anything. I've often asked CSRs whether they ever get to talk to their management about issues in dealing with customers and never once have I heard, "Oh yes, we get to give the company feedback." It's a fact that what goes on at the pointy end of customer service is not of great interest to the majority of large organizations, particularly in the high-tech world.

So, if you are involved in customer service or in IT at a company that provides customer service you have a huge opportunity to identify the limitations of the service your company provides and improve it. At Asurion, wouldn't you have expected the entry of an unexpected serial number by the receiving team to have triggered an exception? Shouldn't the system have flagged that as a customer service issue? Am I just naive expecting that a large company would actually care?

Now, please excuse me. While I'd like to dissect this topic some more, I've got to go and send my old phone to Asurion and then go get a new phone. And cancel the cell phone insurance.

Gibbs was defeated by customer service in Ventura, Calif. Your thoughts to backspin@gibbs.com.

Paul McNamara

NETBUZZ

News, Insights, oddities

I need a 'wallet phone' why?

This looks to me like still-not-here technology aiming to eliminate a minor inconvenience that existing technology has already all but eliminated.

Yet I must be wrong because the cell phone makers and service providers and credit-card companies employ smart people who know their customers, do their market research and, generally speaking, make sound investments in advanced technology.

The conundrum is that it remains unimaginable to me that cell phone buyers will shell out extra money for and/or be more inclined to buy a particular mobile telephone or service because it will allow them to pay for stuff at checkout counters and vending machines by simply waving the device at a wireless reader (they may have to enter a PIN, too, which given the incremental benefits we're talking about here is no trifling matter).

I bring this up now because MasterCard just announced a new service for banks that will supposedly make it easier for them to begin providing this technology to their customers. There was talk of this move possibly being a tipping point for wallet phone evolution, which until now has been as slow as, well, evolution.

I can wait. Last Wednesday night on my drive home I stopped at a take-out restaurant and here's how I paid for my family's dinner: I handed the clerk my American Express card, and she swiped it through a card reader, and handed me a receipt. There was no PIN to enter and nothing to sign. Couldn't have taken 15 seconds.

Would waving my cell phone at a wireless reader have been easier? Not for me, because I don't normally carry my cell phone. But, yes, I suppose those who do might have shaved a few seconds off that less-than-15-second transaction.

Vending machines, you say; all that fumbling for cash, which sometimes isn't there when thirst beckons. Bah. Vending machine vexation was ranked number 1,273 on my list of concerns last time I checked.

Gas stations? Paying at the pump — a genuine technological advance — has already drained 99% of the pain out of settling up after filling up. I won't even get one of those key-chain fobs in a chase for that remaining 1%, so why would I want it from a cell phone.

They say wallet phones have been big overseas with users of public transit. I'm a suburbanite. As I heard it phrased recently, public transit goes from where I don't live to where I don't work.

Think about the experience that early adopters of this technology are likely to endure: You've bought your wallet phone — paid a premium, no doubt — and now you're looking to use the thing. Uh-oh, the convenience store you stop at all the time doesn't have one of the readers and when you ask the manager about it he looks at you like you found a dead rat behind the Wonder Bread. The downtown grocery and liquor stores in my town are so old they have hitching posts out front, so they won't be catering to your gadget-freak need to shave seconds off of your shopping any time soon.

Still, all the big players — Nokia, Sony, Vodafone, Cingular — insist that wallet phones are going to be huge, so who am I to argue.

One last point, though, regarding when we'll know for sure: I first saw this technology at Network World's DEMO conference maybe five or six years ago. The guy from MasterCard told Reuters it'll be at least 2010 before the phones are widely available. And, as for the point-of-purchase readers? Tack on another five or 10 before they reach critical mass.

I may be wrong, all right. — Just don't think about leaving your real wallet at home any time soon.

Don't hold back either. The address is buzz@nww.com.

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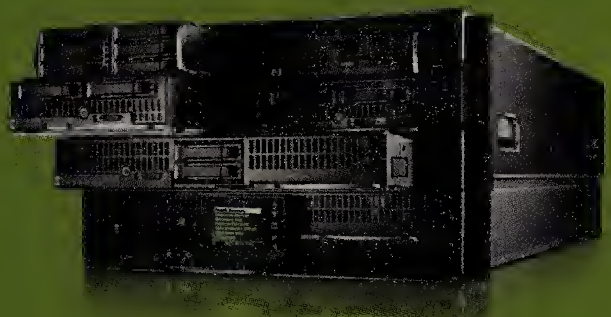

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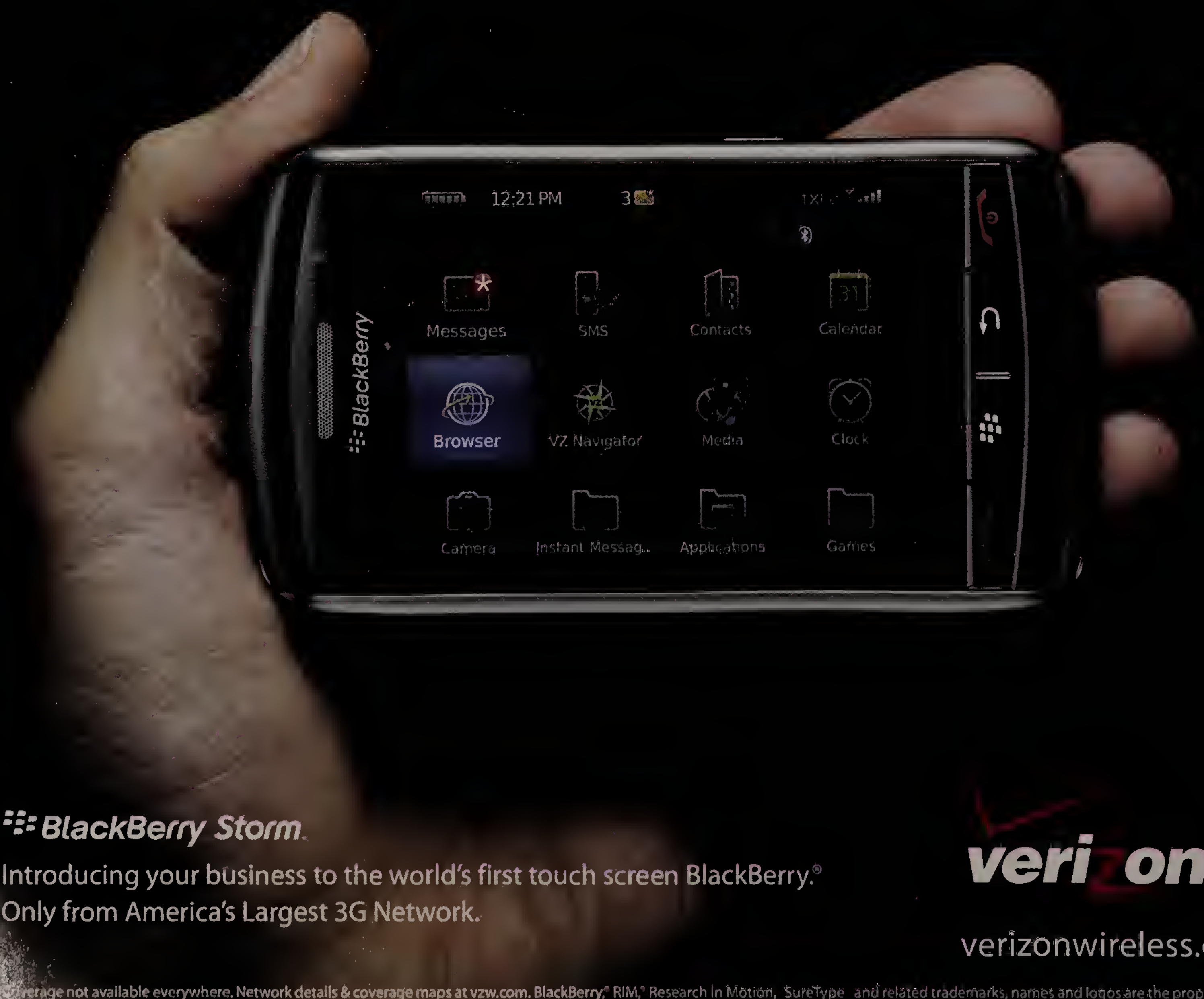
Where is the keyboard? Don't all BlackBerrys have keyboards? This just has a screen that... oh sweet sassafras, did it just click? It clicked right where I wanted it to. Is that supposed to happen? And is it supposed to feel so good?

What mad genius is behind this?



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